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ANNUAL REPORTS

OF THE

WAR DEPARTMENT

FOR THE

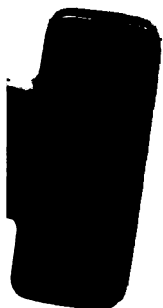
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FISCAL YEAR ENDED JUNE 30, 1903.

VOLUME II.

ARMAMENT, TRANSPORTATION, AND SUPPLY.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1903.



ARRANGEMENT OF THE ANNUAL REPORTS OF THE WAR DEPARTMENT FOR THE YEAR ENDED JUNE 30, 1903.

Volume I.—Secretary of War:

Chief of Staff.
Adjutant-General.
Inspector-General.
Judge-Advocate-General.

Volume II.—Armament, Transportation and Supply:

Quartermaster-General.
Commissary-General.
Surgeon-General.
Paymaster-General.
Chief of Engineers, Military Affairs.
Chief of Ordnance.
Chief Signal Officer.
Chief of Artillery.
Board of Ordnance and Fortification.

Volume III.—Department and Division Commanders:

Department of California.
Department of the Colorado.
Department of the Columbia.
Department of Dakota.
Department of the East.
Department of the Lakes.
Department of the Missouri.
Department of Texas.
Division of the Philippines—

1. Department of Luzon.
2. Department of the Visayas.
3. Department of Mindanao.

Volume IV.—Military Schools and Colleges; Record and Pension Office, Military Parks, and Soldiers' Homes:

Military Academy—

1. Board of Visitors.
2. Superintendent.

Army War College.
General Service and Staff College.
School of Application for Cavalry and Field Artillery.
Artillery School.
School of Submarine Defense.
Chief of Record and Pension Office.
Commissioners of National Military Parks—

1. Chickamauga and Chattanooga.
2. Gettysburg.
3. Shiloh.
4. Vicksburg.

Soldiers' Home, District of Columbia—

1. Board of Commissioners.
2. Inspection of.

Inspection of National Home for Disabled Volunteer Soldiers.

Volumes V-VIII.—Reports of the Philippine Commission, the Chief of Bureau of Insular Affairs, and Acts of the Philippine Commission.

Volumes IX-XIII.—Chief of Engineers, River and Harbor Improvements.

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REPORT OF THE QUARTERMASTER-GENERAL.

REPORT OF THE QUARTERMASTER-GENERAL

OFFICE OF THE QUARTERMASTER-GENERAL,
Washington, D. C., October 28, 1903.

SIR: I have the honor to submit the annual report of the operations of the Quartermaster's Department for the fiscal year ended June 30, 1903.

FINANCIAL STATEMENT.

By acts of Congress approved June 28 and 30, 1902, and March 3, 1903, there was appropriated for the regular service of the Quartermaster's Department for the fiscal year ended June 30, 1903, the sum of.....	\$42,414,494.00
During the fiscal year there was deposited to the credit of appropriations 1903, amounts received from sales to officers, etc	2,521,921.16
Making a total of.....	44,936,415.16
Of this there was remitted to disbursing officers.....	\$29,891,271.28
There was paid out on account of settlements made at Treasury of claims and accounts	219,458.00
	30,110,729.28
Leaving a balance on July 1, 1903, available for payment of outstanding obligations incurred or fulfillment of contracts properly entered into within the fiscal year of.....	14,825,685.88
On July 1, 1902, there was on hand from the regular appropriations for the service of the Quartermaster's Department pertaining to the fiscal year ended June 30, 1902, the sum of.....	27,629,881.09
And from appropriations pertaining to previous fiscal years the sum of.....	17,915,004.99
And from appropriations for special and indefinite purposes, certified claims, etc.....	1,704,213.78
Making a total balance on hand of these appropriations of....	47,249,099.86
For specific purposes there was appropriated during the fiscal year ended June 30, 1903	\$7,155,532.96
During the year there was deposited and transferred to credit of appropriations, other than those of 1903, as shown above, including the sum of \$234,543.03 for Pacific railroads for years 1900 and prior years, 1901, 1902, and 1903, and also the sum of \$362.50 for transportation of volunteers, war with Spain..	3,665,278.81
	10,820,811.77
Making a total on hand from these appropriations of	58,069,911.63
Of said amounts there was remitted to disbursing officers the sum of.....	\$7,439,056.67
There was paid out on account of Treasury settlements	1,335,604.95
There was carried to the surplus fund.....	17,995,262.67
	26,769,924.29
Leaving a balance on hand July 1, 1903.....	31,299,987.34

RECAPITULATION.

Remitted to officers and paid out on Treasury settlements from appropriations for the regular service of the Quartermaster's Department for the fiscal year ended June 30, 1903.....	\$30,110,729.28
From appropriations previous fiscal years, and from indefinite and special appropriations	8,774,661.62
Total	<u>38,885,390.90</u>
Balance remaining in Treasury July 1, 1903, of appropriations for the regular service of the Quartermaster's Department for the fiscal year ended June 30, 1903	14,825,685.88
And of appropriations for previous fiscal years, and for indefinite and special appropriations	31,299,987.34
Total	<u>46,125,673.22</u>

By act of March 2, 1903, making appropriations for support of the Army for the fiscal year 1904, there was made immediately available \$2,000,000 "Barracks and quarters," and \$25,000 "Equipment of officers' schools, military posts," which were designated by the Treasury as 1903 and 1904 appropriations. Of the former there was remitted to officers prior to June 30, 1903, the sum of \$26,934, on which date there remained a balance in the Treasury of those two appropriations of \$1,998,066.

Of the \$200,000 appropriated by act of May 13, 1902, for "Relief of citizens of the French West Indies," there has been charged against the same on the books of this Office during the fiscal year 1903 the sum of \$48,893.70.

Of the \$50,000,000 appropriated by act of March 9, 1898, for "National defense," there has been charged against the same on the books of this Office during the fiscal year 1903 the sum of \$15.22.

I relinquished the duties of chief quartermaster, Division of the Philippines, late in March, and assumed duty as Quartermaster-General on June 1, 1903, so that the great bulk of the operations herein reported upon were under the direction of my predecessor, Maj. Gen. M. I. Ludington.

The fiscal year ended June 30, 1903, while not so active as the four preceding years, was yet a very busy one. Troops who had served their tours of duty in the Tropics were transferred to the United States and others sent out to replace them, and the duty of furnishing rail and water transportation devolved upon and was performed by the Quartermaster's Department; a vast amount of construction work has been undertaken and is under way; new military posts have been established, and several old posts reconstructed and modernized; the important work of effecting the change in the uniform of the Army has progressed with all possible dispatch; the innumerable classes of stores and supplies requisite for the use of the Army, which it is the duty of this Department to furnish, were provided wherever called for; a greatly increased amount of current reading matter was furnished the enlisted men; our national cemeteries have been cared for, and 15,866 marble headstones were provided by the Department to mark the resting places of those who, before they dropped off the muster roll, served their country in the ranks.

CLOTHING AND EQUIPAGE.

The sum of \$4,720,116.98 was available during the past fiscal year for use in providing clothing and equipage supplies for the Army and militia. Of this amount, \$3,066,583.29 were remitted to officers of the Department for the purchase and manufacture of clothing and equipage and requisition for \$7,180.86 issued on settlements made by the Treasury on account of claims, leaving a balance of \$1,646,352.83 in the Treasury on June 30, 1903, nearly all of which will be drawn upon to defray such outstanding indebtedness as was incurred prior to the close of the fiscal year.

There were issued during the year to the militia of the States, Territories, and District of Columbia various classes of supplies to the amount of \$338,711.20.

THE NEW UNIFORM.

A board of officers was convened by the Secretary of War under the provisions of paragraph 14, Special Orders, No. 52, War Department, March 3, 1902, "for the purpose of considering the whole subject of the uniform and equipment of officers and men generally." The proceedings of this board, as modified by the Secretary of War, were published to the Army in General Orders, No. 81, Headquarters of the Army, 1902. Said order was subsequently amended by General Orders, No. 132, of same series, directing that the uniform changes would take effect July 1, 1903, by which date all officers were to uniform and equip themselves as provided in said orders. Officers serving in the Philippine Islands and Alaska are to wear the uniform hitherto prescribed during the continuance of duty there.

Immediately upon the promulgation of General Orders, No. 81, referred to, this Office took steps to perfect standard samples of the new clothing provided for both officers and men. This work has been successfully accomplished. Colored illustrations of the various standard samples of uniforms are now in process of publication, and although delay has been encountered by reason of the magnitude of the work and the many details connected therewith, it is expected that they will be ready for issue early next winter.

During the year a great deal of work has been done with a view of perfecting the materials entering into the olive-drab service uniforms for winter wear. A covert cloth has been decided upon as the most suitable material for the overcoats and breeches, and a serge for the service coat. The service uniform for summer wear and for the Tropics will be made of cotton khaki cloth, as heretofore.

The woolen materials decided upon being of a new and special shade, the greatest precautions have been taken to insure fastness of color. After many experiments, both in this Office and at factories, standard samples of the materials referred to have been adopted and contracts entered into for sufficient quantities for the first equipment of the Army with the new service uniforms.

The specifications for these materials provide that they shall be composed of black, white, and olive-drab wools, mixed in such proportions as to produce the shade of standard sample; the olive-drab and black to be dyed in the wool; colors to be fast and they must stand perspiration and climatic influences, such as sunlight, air, and exposure incident to the military service.

Contracts have also been made for the manufacture of the new dress-coats which will hereafter be of finer cloth, weighing 17 ounces to the linear yard, instead of 20 as heretofore. Purchases are being made of all the other articles of the new uniform, so that the department will be ready at the proper time to commence distribution to the entire Army, and ultimately to the militia of the States and Territories.

Among other things General Orders, No. 132, before referred to, provides that the issues of the new uniform shall be deferred until the present available supply of articles of the old uniform has been exhausted. In this connection it is remarked that on June 30 there were on hand at the general depots the following quantities of clothing, representing a money value of approximately \$3,000,000, which must be exhausted, viz:

- 31,556 helmets, untrimmed.
- 26,428 forage caps.
- 84,739 overcoats.
- 29,528 dress coats.
- 244,791 blouses, lined and unlined.
- 116,922 pairs trousers, kersey, mounted.
- 241,890 dark blue shirts.
- 220,932 pairs khaki trousers.
- 232,530 pairs leggings.
- 33,121 pairs buckskin gauntlets.

How best to accomplish the introduction of the new uniform has required much study, it being necessary to carefully consider—

First. How to arrange so as to leave the least amount of the old for final condemnation and sale.

Second. How to accomplish the change from the old to the new uniform and avoid having uniforms mixed in the same command.

It is evident that the desired results can be best obtained by taking up one organization at a time and completely uniforming it under the new order, and thus let the change throughout the Army be gradual and the time of its final accomplishment be determined by the supplies to be issued. Thus the number of organizations to wear the old uniform will be constantly diminished and the best opportunity offered thereby for exhausting the old stock to the fullest extent practicable.

Aside from the question of minimizing the loss to the Government by exhausting supplies on hand is the problem of changing the uniform from the old to the new with the least expense to the enlisted men. Requests from organizations and parts of organizations now fully equipped with the old are being received for issue of the new uniform. To comply with these requests would entail much loss upon the enlisted men who are provided with the old clothing, as it would hardly be desired to have some members of an organization in the one and some in the other uniform. To keep the loss down to the minimum it has been decided that issues of the new uniform shall commence with organizations returning from the Philippine Islands, as after a tour of service in those islands the commands have practically no articles of woolen uniforms in their possession, and the prospect of three or four years' service in the United States justifies their equipment throughout with the new uniform.

Under existing orders the Artillery Corps and engineer troops serving in the United States wear the old full-dress uniform. This will be continued until the stock on hand is exhausted, except in the cases of battalions or companies returning from the Philippines.

SIZES OF CLOTHING AND SHOES.

Consideration has been given to the matter of establishing such an assortment of sizes in the new dress coats and trousers, overcoats, and service uniforms as will insure securing a proper fit, as far as can be without making clothing to individual measurements, and eliminate complaints on this score. The dress and service coats and trousers and breeches will hereafter be of 18 sizes and the overcoats of 10 sizes, similar to those which can be obtained in any large clothing house. Experiments made with a full assortment of the new sizes have demonstrated that, if care is taken to select and issue the correct sizes in every individual case, the alterations of clothing will be unnecessary except in very few instances. Future manufactures of shoes will conform to trade widths and sizes.

KHAKI MATERIAL OF LIGHTER WEIGHT.

Believing that the 7½-ounce material used in the cotton khaki clothing, while about the right weight for trousers, is too heavy and uncomfortable for coats when worn in tropical climate, this office ordered the purchase of 5,000 yards of 6½-ounce material. This will be made up into garments and sent to the Philippines to ascertain whether this weight will prove more satisfactory than the heavier khaki.

LEGGINGS, NEW PATTERN.

The principal complaints regarding canvas leggings supplied by the department to enlisted men have been, (1) the objection found by mounted men to side lacings; (2) the leather strap at instep; (3) the flare of the canvas in front with consequent tendency to collect dirt. For the purpose of overcoming these defects this department selected and purchased 500 pairs of a legging the parts of which, upon being joined, closely conform to the contour of the leg, which is laced in front and made without a bottom strap. These were distributed for trial at Washington Barracks, D. C.; Fort Meyer, Va., and Governors Island, New York Harbor. From reports thus far received it is learned that the new leggings are more satisfactory, neater in appearance, cooler, and less binding on the ankle than the old leggings. It is probable that decision will be reached to adopt the legging now on trial.

METHOD OF ENFORCING TIME LIMITS UNDER CONTRACTS FOR CLOTHING AND EQUIPAGE.

Experience has shown that it is very difficult to enforce the time limit of contracts even under the most improved form of bond, therefore, during the past year the department adopted a clause which is now included in all contracts for clothing and equiptage supplies, which provides that for all supplies not delivered in conformity with the contract requirements on or before the dates agreed upon, but subsequently delivered and accepted, the prices to be paid shall be the remainder after deducting from prices paid for the supplies delivered within the time limit one-tenth of 1 per cent for each day of the first thirty days' delay, and one-fifth of 1 per cent for each day thereafter. This reduction in price does not apply where delays are caused by strikes, riots, fires, floods, or other unavoidable disaster, or delays while in transit

or in deliveries by transportation companies, or caused by the inspections of the department. The good results from this clause are already apparent.

DISINFECTING CLOTHING.

Having in view the danger of the conveyance of disease by uniform clothing from operatives employed in its manufacture, this Office ordered the installation at the Philadelphia and Jeffersonville depots of disinfecting plants, consisting of formaldehyde generators for the fumigation, in a special room set aside for that purpose, of all clothing received before same is packed for issue. It is intended to have a similar plant installed at Manila, it being considered that it will materially aid in preventing infection.

INSPECTING CLOTHING.

Steady progress has been made in improving the methods of inspection of clothing and equipage purchased and manufactured at the general depots. In this Office there are on duty an expert textile inspector and an expert shoe and leather inspector. At each of the general depots and delivering points there are experienced inspectors charged with the duty of seeing that in quality of materials and workmanship in making-up the articles furnished the Department under contract meet the standard requirements in every particular. The Quartermaster-General is glad to mention the thorough and satisfactory manner in which the inspectors have performed their duties, with the result that supplies procured have been, it is believed, fully up to standard and specification requirements.

CAVALRY AND ARTILLERY HORSES AND MEANS OF TRANSPORTATION.

The following statement shows the number and cost of public animals, wagons, and harness purchased by this Department from July 1, 1902, to June 30, 1903:

	Number.	Total cost.	Average cost each.
Cavalry horses	2, 144	\$278, 006. 15	\$129. 67
Artillery horses	111	17, 228. 00	155. 20
Riding horses	14	1, 475. 00	105. 35
Draft horses	26	5, 038. 00	193. 77
Draft mules	366	51, 384. 66	140. 40
Pack mules	180	22, 339. 75	124. 11
Spring wagons, Dougherty	50	10, 800. 00	216. 00
Wagonettes or other kinds	27	9, 179. 55	339. 82
Trucks, 2 and 4 horse	6	1, 425. 00	237. 50
Dump carts	35	1, 670. 00	42. 40
Dump carts, sanitary	75	15, 000. 00	200. 00
Express wagons	5	884. 00	176. 80
Water wagons, sprinkling	22	5, 476. 00	249. 90
Spring wagons, delivery	1	120. 00	120. 00
Miscellaneous wagons	27	4, 308. 00	159. 50
Sleighs	6	240. 00	40. 00
Single sets harness	197	6, 223. 20	31. 59
Cart harness	166	3, 876. 00	23. 35
Oldsmobile	1	735. 00	735. 00
Ambulances	51	11, 586. 18	227. 18
Water carts, sprinkling, etc	4	369. 00	92. 25
Total		447, 863. 49	.....

Total cost of army ranges, ovens, typewriters, and office safes amounted to \$137,114.17.

Forage and straw were purchased and shipped to the Philippines, Cuba, and Porto Rico as follows, viz:

	Pounds.
Philippines:	
Hay	23, 204, 000
Oats	27, 398, 000
Cuba:	
Hay	330, 740
Oats	280, 815
Bran	12, 500
Straw	53, 840
Porto Rico:	
Hay	1, 689, 305
Oats	1, 926, 740
Bran	150, 900
Straw	303, 156
Corn	13, 170

In the same period various kinds of native forage were purchased in the Philippines, Cuba, and Porto Rico:

	Pounds.
Philippines:	
Native forage	22, 951, 874
Cuba:	
Green grass	120, 395
Native hay	18, 900
Porto Rico:	
Green grass	228, 000
Native hay	36, 000

Condemned animals have been sold as follows:

Kind.	Number.	Amount received.	Average price each.
Cavalry horses	758	\$29, 805. 60	\$39. 32
Artillery horses	220	10, 627. 60	48. 31
Draft horses	43	1, 099. 50	39. 52
Mules	176	10, 924. 92	62. 07

During the year there were 4,150 horses and 1,806 mules lost, died, or stolen, etc. Of these 3,177 horses and 1,328 mules were destroyed or died in the Philippines, the most common complaints being glanders and surra.

There remained on hand at the close of the fiscal year 1903, 17,195 horses and 7,146 mules.

TRANSPORTATION.

The following statement shows that during the fiscal year ended June 30, 1903, transportation was furnished, exclusive of army transport service, for 1,007,862 persons, 5,640 animals, and 220,209 tons of material:

	Railroad.	Water.	Wagon.	Stage.	Government vessels. ^a	Total.
Passengers:						
Officers	4,648	476	-----	76	57,474	62,674
Men	82,864	10,458	49	842	850,990	945,188
Total	87,502	10,929	49	918	908,464	1,007,862
Animals:						
Horses	3,204	924	-----	-----	239	4,367
Mules	1,023	240	-----	-----	10	1,273
Total	4,227	1,164	-----	-----	249	5,640
Stores:						
Subsistence	19,358	5,539	4,066	-----	8,670	32,628
Quartermasters'	30,212	24,547	21,358	-----	8,098	84,215
Ordnance	26,523	3,083	1,437	-----	3,789	33,832
Medical	1,320	297	757	1	107	2,482
Signal	998	1,953	44	-----	606	3,601
Miscellaneous	16,376	1,178	34,761	1	11,135	63,451
Total	93,782	36,597	62,423	2	27,405	220,209

^aThis includes all passengers carried on Government ferryboats plying between military posts and adjacent cities.

CHANGE OF STATION ALLOWANCE OF BAGGAGE.

The authorized change of station allowance of baggage as provided by regulations being considered very much less than it should be, in view of the great change in conditions existing when that allowance was fixed upon and at present, before the close of the fiscal year this Office took into consideration this question, and it was decided to recommend that as officers' personal and movable property which must be taken from station to station amounted to a great deal more at this day than formerly, and as railroad rates had been reduced from time to time until now several times the authorized allowance could be transported at a cost no greater than what it did cost to transport that allowance when it was fixed, officers' authorized change of station allowance of baggage be trebled, the field allowance increased, and a baggage allowance established for officers ordered on duty in connection with maneuvers, rifle contests, and other duty involving a temporary change of station.

In this connection and at the same time consideration was given the fact that while a threefold baggage allowance had been established for officers ordered on foreign duty, this was of no advantage unless an officer desired to have that entire allowance shipped to his foreign station, something not desired one case in a hundred, as household furniture used in the States is not suitable for use in the Tropics, and it is possible to obtain the class of furnishings desirable for that climate at very reasonable prices; it was readily concluded as only fair that an officer ordered to foreign duty should be granted the privilege of having such of his allowance as he does not take with him shipped to his home or any point he may designate for storage, and from such point to his new station when he returns to the States. The taking up

of this matter naturally brought to mind the requirement of regulations that an officer whose station was changed should have had his horse or horses at his old station in order to be entitled to transportation for them at Government expense to the new station. This Office was of opinion that whenever an officer desired to have the number of horses for which he is allowed forage shipped from some intermediate point between his old and new station, such shipment should be made by the Department, provided, of course, the cost would not be greater than to make shipment from the old station. Decision was reached to recommend amendments in the regulations to cover both of these matters as well as the increase in baggage allowance.

Since the close of the fiscal year these much-desired changes in regulations have been ordered.

HARBOR VESSELS DISPOSED OF AND ACQUIRED.

During the fiscal year the tugs *General Ayres*, stationed at Boston, Mass., and the *Reynolds*, at Fort Dade, Fla., and the launch *Woodruff*, at Fort Morgan, Ala., were condemned and sold, as no longer serviceable and not worth cost of repairs, and the towboat *Captain Worden* and barkentine *Jane A. Falkenberg*, stationed in Alaska, were sold, as no longer required.

The two standard steel boats for harbor service, contracted for during the fiscal year 1902, were completed and accepted by the Department from the contractors and named *Henry Wilson* and *Sprigg Carroll*. The former cost \$55,151.35, and the latter \$55,193.34. Both of these vessels have been in commission for some time.

The steamer *Major Guy Howard*, constructed of wood, at Portland, Oreg., at a cost of \$23,000, which is similar in design to the *Henry Wilson* and *Sprigg Carroll*, was completed and accepted last March and is stationed at Fort Stevens, Oreg., for use in supplying posts at the mouth of the Columbia River.

To meet the needs of the service at Seattle, Wash., and the posts in Puget Sound, the Department purchased in June, 1903, the steamer *Lotus*, which has been renamed *Cartwright*, and is stationed at Seattle and operated on triweekly service between that city and Forts Flagler, Worden, and Casey.

It having been demonstrated that to best safeguard the public interests in the vicinity of Skagway, Alaska, there should be stationed there a vessel sufficiently large to transport a company of troops between points of the Alaskan coast in that locality, in the month of June the Department purchased the steamer *Flossie* at a cost of \$14,000. This vessel has been renamed the *Peterson* and is stationed at Haines Mission, Alaska.

Two 45-foot steam launches, contracted for during the fiscal year 1902, at a cost of \$5,570 each, were completed and accepted in October, 1902. They were named *Lancaster* and *Mansfield* and the former sent to Fort St. Philip, La., and the latter to Fort Mansfield, R. I., for service.

An electric launch, for use of the School of Submarine Defense, Fort Totten, N. Y., was purchased during the year at a cost of \$2,400.

VESSELS UNDER CONSTRUCTION.

At the close of the fiscal year there were under construction two standard harbor service steamers, to cost \$52,500 each, the intention being to station one at Fort Trumbull, Conn., for service in connection with posts in the New London artillery district, and the other in New York Harbor for supplying posts in and around that harbor; a 45-foot steam launch, to cost \$5,750, to be named *Captain Page*, and used between Forts Morgan and Gaines, Ala.; two 130-foot standard steamers, one being built on the Atlantic coast, to cost \$88,000, and one on the Pacific coast, to cost \$110,000, the former for the joint use of the Signal Corps and Quartermaster's Department in the vicinity of New York, the latter for service in San Francisco Harbor.

The School of Submarine Defense having requested the construction of a certain type of boat for use in connection with the course of instruction at that school, and also at artillery posts on the seaboard, this Office entered into consultation with the torpedo board of the school and prepared plans and specifications for four boats, the construction of which, at a cost of \$122,000 each, is now in progress.

ARMY TRANSPORT SERVICE.

There were semimonthly sailings of the transports between San Francisco and the Philippine Islands until October, 1902, when orders were given to reduce the sailings to one transport each month. At present a transport is scheduled to sail from San Francisco on the 1st and from Manila on the 16th of each month. There are extra sailings when the interests of the service require them.

WORK OF THE TRANSPORT SERVICE.

The following is a list of the army transports which have sailed from San Francisco to the island possessions during the fiscal year, showing the number of passengers carried by each, viz:

Name of transport.	Left San Francisco—	Officers.	Soldiers.	Civilians.	Total.
Kilpatrick.....	July 1, 1902	19	355	43	417
Sherman.....	July 16, 1902	17	83	60	160
Logan.....	Aug. 1, 1902	8	43	35	86
Sumner.....	Aug. 16, 1902	16	385	42	443
Sheridan.....	Sept. 1, 1902	20	61	64	145
Crook.....	Sept. 16, 1902	16	20	45	81
Thomas.....	Oct. 1, 1902	27	61	55	143
Logan.....	Nov. 1, 1902	40	57	116	213
Sherman.....	Dec. 1, 1902	24	90	129	243
Sheridan.....	Jan. 1, 1903	19	109	89	217
Thomas.....	Jan. 31, 1903	43	1,198	84	1,320
Kilpatrick.....	Feb. 28, 1903	41	799	20	860
Logan.....	do.....	36	890	109	475
Sheridan.....	Apr. 1, 1903	61	1,019	77	1,157
Sumner.....	Apr. 20, 1903	8	21	81	110
Thomas.....	May 1, 1903	67	1,195	51	1,313
Logan.....	June 1, 1903	70	1,041	73	1,184
Total.....		532	6,862	1,173	8,567

There were also carried on these transports 363,958 packages of freight, making 33,820 tons measurement, 12,022 pieces of baggage, 1 horse, 437,098 pounds of mail matter, and \$8,916,000 in money.

The following is a list of the army transports sailing from the Philippine Islands during the fiscal year, showing the date of their arrival in San Francisco and the number of passengers carried, viz:

Name of transport.	Arrived at San Francisco—	Officers.	Soldiers.	Civilians.	Total.
Logan	July 8, 1902	52	1,284	87	1,378
Sheridan	July 19, 1902	68	1,438	74	1,580
Sumner	July 22, 1902	29	622	61	712
Thomas	Aug. 1, 1902	57	1,578	69	1,704
Lawton	Aug. 12, 1902	29	615	22	666
Crook	Aug. 13, 1902	81	624	40	695
Relief	Aug. 14, 1902	16	18	63	97
Buford	Sept. 6, 1902	35	892	56	983
Meade	Sept. 11, 1902	34	880	41	955
Kilpatrick	Sept. 14, 1902	35	660	103	798
Sherman	Oct. 8, 1902	41	263	144	448
Logan	Oct. 13, 1902	42	997	103	1,142
Sheridan	Oct. 31, 1902	38	962	105	1,105
Sumner	Nov. 10, 1902	8	6	31	44
Crook	Nov. 28, 1902	30	480	75	585
Thomas	Dec. 22, 1902	22	1,162	132	1,316
Logan	Jan. 13, 1903	37	1,558	140	1,835
Sheridan	Mar. 3, 1903	29	1,257	136	1,422
Thomas	Apr. 3, 1903	33	1,047	124	1,204
Logan	Apr. 28, 1903	51	1,436	96	1,583
Sherman	May 20, 1903	17	280	148	445
Sheridan	June 6, 1903	83	1,121	47	1,251
Total		817	19,229	1,897	21,943

There were also transported on the above-mentioned transports from the Philippine Islands to San Francisco 329 remains of officers, soldiers, and civilian employees; 61,045 packages of freight, making 11,350 tons measurement; 25,397 pieces of baggage, and 94,653 pounds of mail matter.

At the beginning of the fiscal year the large freight transport *Dix* was on a voyage from Seattle to Manila with a load of forage. She returned to the United States in the fall of 1902 and before the end of the year made two more trips to the Philippines, her cargo on the first voyage consisting of 3,430,600 feet of lumber, 993 tons of oats, and a quantity of iron and miscellaneous freight; on the second voyage she carried 3,900,156 feet of lumber, 600 tons of hay, 3 passengers, and 5 horses.

On July 8, 1902, the transport *Warren* was dispatched from Seattle to Fort Davis and St. Michael, Alaska, with 12 officers, 344 enlisted men, 30 civilians, and 1,714 tons of supplies. On the return voyage, arriving at Seattle August 5, 1902, the *Warren* carried 8 officers and 356 enlisted men, making a total of 750 passengers transported between Seattle and Alaska.

The transport *Seward*, which had been operated as a dispatch boat in Alaskan waters, was fitted up at Seattle, Wash., as a refrigerating ship for service in the Philippines, where she arrived September 25, 1902, and has since been employed distributing supplies to the different islands in the archipelago. The cost of converting the *Seward* into a refrigerating ship and making all necessary repairs to her was \$65,071.71.

Only one transport made the trip between the Philippines and New York during the fiscal year. The *McClellan* sailed from Manila October 1, 1902, with 15 officers, 2 enlisted men, 31 civilians, 1,439 tons of freight, and 242 pieces of baggage, arriving in New York November

29, 1902. At the close of the year the *Kilpatrick* and *Sumner* were under orders to sail from Manila to New York via the Suez Canal route.

At the end of June the transport *Burnside*, which had been in service in the Philippines as a cable ship and interisland transport, was en route to Sitka, Alaska, for service in connection with laying the cable between the mainland of the United States and Alaska.

TRANSPORTS TO STOP AT HONOLULU.

During the year only five transports stopped at the port of Honolulu en route between the States and Manila. I am in favor of making Honolulu a regular port of call for all transports going to and returning from the Philippines for the reasons: (1) That that route is seldom stormy and is the one taken by all commercial liners, and in the event of a mishap to any transport she would be on a route where there would be probability of her being promptly sighted and given relief, whereas the route taken by transports which do not stop at Honolulu is often very cold and rough and is little frequented by other vessels, most of the transports making the voyage from port to port without passing a ship of any kind. The danger of this route in the event of a transport becoming disabled at sea is obvious. (2) The cable which now connects Honolulu, Guam, and the Midway Islands with the mainland enables this office to receive reports en route from vessels traveling via Honolulu and Guam. (3) If vessels go by way of Honolulu, the department will be able to give the business of purchases of fuel and supplies and of making such running repairs as may be necessary to this American port. In June I stated my views on this subject to the Secretary of War, who approved the recommendation that Honolulu be made a regular port of call for the ships of the Pacific fleet, and during the next fiscal year this will be done, provided it is found that a suitable quality of coal can be obtained by the transports at Honolulu at a reasonable price.

Nagasaki, Japan, should continue to be a port of call for the transports returning from Manila, as it has been for the past several years. Last year the price per ton for coal delivered to transports at Manila was \$5.38, while it cost but \$3.70 per ton at Nagasaki. Because of this difference only sufficient coal was taken at Manila to carry the ships to Nagasaki. In addition to this saving the fact that the Department receives cable reports from Nagasaki of the arrival and sailing of the transports and their condition is an advantage. Moreover, by going by way of Nagasaki the Department is enabled to afford transportation to officers and enlisted men who obtain leave of absence in the Division of the Philippines, and to whom a trip in Japan is of immense benefit after service in the enervating Philippine climate. This they could not otherwise afford.

SUMMARY OF WORK OF THE TRANSPORTS.

The following is a recapitulation of the work done by the trans-oceanic transports during the fiscal year:

Passengers:

From the United States to the Philippines	8,570
From the United States to Honolulu, Hawaii.....	14
From the United States to Alaska	388
From the Philippines to the United States	21,991
From Honolulu to the United States.....	25
From Alaska to the United States.....	364
Total	31,350

Freight:

	Tons.
From the United States to the Philippines	53,718
From the United States to Alaska	1,714
From the Philippines to the United States	12,789
Total	68,221

In addition to the above, 329 remains of officers, enlisted men, and civilian employees were brought home, and there were transported between the States and the Philippines 37,661 pieces of baggage, 531,751 pounds of mail, \$8,916,000 in United States currency and coin, and 6 horses.

VESSELS TRANSFERRED TO OTHER DEPARTMENTS.

In October, 1902, the transport *Grant* was turned over to the Engineer Department of the Army and by that department has been converted into a deep-sea dredge.

In November, 1902, the transports *Hancock*, *Lawton*, and *Relief* were, by direction of the Secretary of War, at the request of the Secretary of the Navy, transferred to the Navy Department.

TRANSPORTS SOLD.

During the past fiscal year there were sold the transports *Egbert* and *Rosecrans* for \$50,000 each, the *Sedgwick* for \$52,000, and the steam yacht *Viking* for \$14,377.

The experience of the Department in its efforts to sell such of the transports as it was not actually necessary to keep in active service at all times has demonstrated that it is impossible to obtain prices commensurate with the real value of the vessels and, therefore, it has been determined to lay up the spare ships—two or three on the Atlantic coast and the others in the harbor of San Francisco. Ships thus laid up are kept in such condition that the Department stands ready to put them into active service on short notice should an emergency arise requiring their use.

OCEAN GOING OWNED VESSELS.

On June 30, 1903, the following ocean going owned transports were in active service: *Burnside*, *Dix*, *Ingalls*, *Kilpatrick*, *Liscum*, *Logan*, *Seward*, *Sheridan*, *Sherman*, *Sumner*, *Thomas*, and *Wright*. The transports *Buford*, *Crook*, *McClellan*, *Meade*, and *Warren* are out of commission but ready for service on short notice in case of need.

To maintain the trans-Pacific transports in a thoroughly seagoing condition, upon the arrival at San Francisco of each ship, after making the trip to the Philippines and return, a board consisting of the gen-

eral superintendent, the marine superintendent, the superintending engineer, the quartermaster, master, and chief engineer of the transport, makes a thorough and careful inspection of the vessel to ascertain the repairs required, and the work of making the repairs deemed necessary by this board is let to the lowest bidder after competition. The average cost of repairs to transports regularly employed running between San Francisco and Manila was \$3,300 per round trip last year. The services performed by these vessels represented 16 round trips, an aggregate distance traveled of approximately 225,000 miles.

VALUE OF THE OWNED TRANSPORT SERVICE.

The fiscal year ended June 30, 1903, saw a continuance of the heavy demands upon the army transport service and an economical, efficient, and highly satisfactory response to those demands. The movement of surplus regiments to the United States and the bringing home of some 2,000 soldiers discharged in the Philippines had just been completed in December, 1902, when orders were published directing a movement which involved the transportation of two regiments of cavalry, five regiments of infantry, and seven companies of artillery from the United States to the Philippines, and of three regiments of cavalry, five regiments of infantry, and seven companies of artillery from the Philippines to the United States. In addition to these organizations and the large number of officers and enlisted men—detached from organizations—traveling between the States and the Philippines under official orders, and officers of the Navy, the transport service has afforded transportation for the families of officers of the Army and Navy, enlisted men, and civilian employees, in this way being of inestimable benefit to those serving in the far away island possessions. Also, whenever practicable, transportation has been furnished to officials and employees of the civil government of the Philippine Islands, but the reduction of sailings to one transport per month and the orders transferring troops have resulted in taxing the capacity of the ships to accommodate military passengers, thereby rendering it impossible to furnish transportation for any great number of civil government officials and employees. When the large movement of troops exchanging stations is completed it will be possible to do more in this connection for the insular authorities.

Since its organization in 1898 the army transport service has done great work. Five years' continuous experience in foreign service firmly convinces me that the abandonment of this branch of the service would be a mistake. So long as we have garrisons beyond seas the transport service will be a most valuable adjunct to the Army's transportation facilities. Even assuming that commercial lines had been in position to handle the great volume of business of the Army during the past few years—which they admittedly were not—I do not believe that it could have been handled as economically for the Government, and certainly not near so satisfactorily, as it was by the transport service.

Aside from an economic standpoint, there are considerations in favor of the maintenance of the transport service which can not be estimated in dollars and cents. Not the least among these considerations are (1) the comfort of the enlisted men during the long ocean voyage, part of it in a tropical climate, and the universally splendid condition of our soldiers when they disembark attests the excellence of the

troop accommodations on the transports; (2) bright, sanitary, and comfortable hospitals in which to properly care for those who become sick en route, as well as the sick being brought home; an average of 100 sick soldiers are returned to the States on each transport; how much this well-equipped hospital feature means to our sick soldiers is apparent to all who give the matter any thought; (3) the privilege which enlisted men and civilian employees, as well as officers, are granted of having their families transported to them while serving in the islands; without this they could not afford to have their families with them and the hardships of foreign service would be greatly increased; (4) the bringing home the remains of ex-soldiers and civilian employees who die in the Philippines, the transportation of which would not otherwise be authorized.

It has been repeatedly demonstrated that taking into consideration the number of passengers, tons of freight and baggage, pounds of mail carried free of expense to the Post-Office Department, and large amount of currency and coin safely transported, the transport service has been the means of saving many thousands of dollars to the Government, when the cost of that service is compared with what similar services would have cost the Government had they been performed by commercial steamers.

Careful compilation of expenditures made by all officers on account of the transport service shows the total cost of the transoceanic transport service during the fiscal year 1902-3 to have been \$1,752,560.46. The transportation by commercial lines of the same number of passengers and the same amount of freight, mail, etc., between the United States and the Philippines and Alaska would have cost \$4,000,999.90. This commercial cost is based upon prevailing tariff rates at San Francisco, where the Department had no contract rate last year, the contract rate existing at Seattle, and the rates obtained by the Department for shipments made by merchant vessels between New York and Manila. The amount, \$1,752,560.46, given as the cost to the Department of its own transport service, includes every item of expense in any way connected with superintendence, maintenance, and operation. Not an expenditure which would not have been incurred had there been no army transport service has been omitted. The figures include the cost of supplies of every kind; of all repairs and alterations; salaries of all officers and crews; subsistence of crews; pay of shore employees, including clerks on work connected with transports; the salaries and commutation of quarters of army officers whose services were on, or in any way connected with, transports; the cost of embarking and disembarking passengers, loading and unloading freight. Care has been taken to make this compilation most inclusive, and if there is any error it is on the side of charging too much against the transport service rather than too little. It will be noted that the difference in favor of the transport service is \$2,248,439.44.

The cost of the oceanic transport service, as well as of the inter-island branch, as hereinafter shown, during the last fiscal year was to some extent extraordinary because of the number of costly accidents.

While it is true that the Government can, under present conditions, obtain contracts for over-sea transportation at figures far below the prevailing tariff rates, it is not possible to predict what rates would be obtainable under changed conditions, it is not believed that any material saving would result in the long run, and it is positive that

there would be no comparison in the quarters occupied by the soldiers during their 7,000 miles of ocean travel or in the hospital accommodations for the sick.

INTER-ISLAND BRANCH OF ARMY TRANSPORT SERVICE.

The service performed by the inter-island transports in the Philippines is fully reported on in my report as chief quartermaster, Division of the Philippines, rendered March 31, 1903, and in the annual report of the chief quartermaster of the division.

At the close of the fiscal year there were 5 owned and 15 chartered ships engaged in the inter-island transport service in the Philippines. In addition to these there was a large fleet of smaller craft in service at the different ports. The inter-island transports are now running on a regular time schedule and their masters are compelled to live up to its requirements. There is no longer uncertainty at the posts throughout the archipelago as to when supplies and mail will reach them. Quartermasters at posts on the established transport routes are furnished copies of the schedules and know just when to expect the next vessel, so that they are fully prepared to unload and load without delay. This arrangement is very satisfactory to all concerned. It has been evolved after much experiment as to the time that could be made between ports and the time required to load and unload at each port. The Post-Office Department also is benefited, as it knows just what boats it can take advantage of and is prepared to dispatch mail accordingly.

The suggestion has been made that it would be wise and economical to do away with our inter-island transport service in the Philippines and turn over the work to local commercial lines, and, in fact, this course has been recommended. Under present conditions my views do not concur in this suggestion, and I make an exactly contrary recommendation.

The inter-island branch of the army transport service has thus far performed the work of supplying the archipelago much more economically than it was done by steamers engaged in commercial traffic before the establishment of that branch and without doubt cheaper, as well as better, than it could be done by commercial line steamers operating in the Philippines. In fact, the use of commercial vessels is entirely out of the question, unless the Department could get contracts providing for rates greatly below the existing tariff rates. The present tariff rates, though considerably lower than what they were formerly, are still exceedingly high; for instance, from Manila to Batangas, a distance of 95 miles, the Manila steamship companies charge a rate of \$5 United States currency per ton; and to Zamboanga, 495 miles distant, \$10 per ton. Passenger rates are equally high, being \$6 to Batangas, and \$40 to Zamboanga. The Department could not afford to do business with the Philippine steamship companies at such prices, and that was the principal reason why the plan of chartering vessels for Government service was resorted to.

The total cost of maintaining and operating all classes of water transportation employed in the Division of the Philippines—interisland transports, refrigerator ships, cable ships, chartered steamers, schooners, launches, lighters, lorchas, cascoes, and in fact every sort of craft—including coal and the cost of handling it, all supplies and

repairs, labor of all classes, during the fiscal year ended June 30, 1903, was \$2,319,948.70. This amount does not, however, represent the cost of the interisland transport service properly so called, but, as stated, includes the cost of all kinds of water transportation.

This grand total may be itemized and explained as follows:

Four hundred and eighty-three thousand eight hundred and sixty dollars and eighty-nine cents represents the expense for water transportation operated within the different military departments of the division under the direction of the department commanders, and not employed in transporting troops and freight between Manila and interisland ports. This cost is analogous to the expense of maintaining and operating coast and harbor boats provided for service at military posts along the seacoasts of the United States. These department boats are no more a part of the interisland transport service than the boats stationed at Governors Island, New York Harbor, or Fort Dade, Florida, are part of the oceanic transport service.

One hundred and sixty-four thousand five hundred and fourteen dollars and three cents was expended for maintaining and operating the refrigerator ships *Seward* and *Wright*, used to furnish soldiers at posts throughout the Philippines with fresh beef in first-class condition. It is impossible to obtain this service from any of the commercial lines operating in the Philippine Islands, and it is hardly necessary to comment upon its value. Even were the interisland transport service discontinued and an attempt made to do the work commercially, the Department would still be compelled to operate its own refrigerator ships.

One hundred and seventeen thousand nine hundred and ninety-five dollars and eighty-five cents represents the cost of the *Burnside* while engaged in service exclusively as a cable ship—certainly not a charge against the transporting of troops and their supplies. There was only one commercial cable ship anywhere near the Philippines, operating from Singapore, and had it been practicable to contract for her services for any definite periods, which it was not, the charge would have been \$750 per day. On this basis the use of the *Burnside* for cable work was more economical than the performance of that service by contract would have been. The Quartermaster's Department would not have retained the *Burnside* in the Philippines for interisland transport work as she is too large and expensive for that service.

Ninety-three thousand three hundred and forty-one dollars and twenty-eight cents is the sum which was expended for maintaining a dispatch steamer and dispatch launch under the direction of the division commander. The transport *Ingalls* and the launch *Buffalo* were on this duty throughout the year, neither being engaged in the transporting of troops and supplies as part of the regular line doing this work. This is no more a proper charge against the transport service than is the cost of operating the dispatch boat at headquarters of the Department of the East.

Twenty-four thousand five hundred and forty-four dollars and thirty-four cents, cost to the Department for loading and unloading commercial vessels on which Government shipments were made.

Three hundred and seventy-five thousand six hundred and fifty-nine dollars and fifty-three cents were expended for river transfers of troops and supplies from and to the quartermaster's dock to and from garrison storehouses, forage corrals, lumber yards, etc., along the

Pasig River at Pandacan, Santa Mesa, and Fort William McKinley, the military post now under construction; the gathering at various islands and transporting to Manila of remains of deceased officers, enlisted men, and employees; the loading and discharging of coal for distilling plants, ice machines, etc., and the cost of lighterage used exclusively in the handling of coal.

One hundred and twenty thousand four hundred and twenty-six dollars and sixty-five cents represents the total cost of maintaining and operating small steamers, launches, lighters, cascoes, and other boats used in what may be termed the river, lake, and bay service. Here there are no regular commercial steamship lines operating, and it would hardly be practicable, under existing Philippine Island conditions, to do this work by contract. It has never been possible to obtain from the individuals owning craft which are irregularly operated in the river, lake, and bay any bid for services transporting troops or supplies, although several attempts were made to learn what, if any, proposition they would make. Having no commercial rates it is not possible to compare the cost of this service with what the same would have cost if performed under contract.

I now arrive at the cost of the interisland transport service to the Government as against what that service would have cost had it been performed by interisland commercial steamship companies. The total cost of our interisland transport service, by which is meant the service transporting passengers, animals, supplies, and mail from Manila to ports throughout the Philippine Archipelago and from those ports to Manila, during the past fiscal year, was \$939,606.13. To have transported the same number of passengers, number of animals, and the same amount of freight and mail, at the prevailing tariff rates of the Philippine steamship companies for passengers and freight, the cost of mail being figured at the mileage rate paid by the Post-Office Department to regularly established steamship companies in this country, would have cost \$1,027,977.27.

While this shows a difference in favor of our own service of \$88,371.14, the real difference is considerably greater for the reason that the cost of operating the transport service includes every item of expense connected with transportation from dock to dock, while the commercial rates include the taking and disembarking passengers at ship's side (it being remembered that only small vessels go to dock) and the reception and delivery of freight in the ship's tackle out in the harbors. Had the work been intrusted to commercial lines there would, therefore, have been the additional expense of transfers to and from wharves, amounting to approximately \$100,000, making the real difference in favor of the interisland transport service \$188,371.14 for one year.

The foregoing figures have been compiled with great care. As with the cost of the ocean transport service, so with this, I have been careful to have included every item of expense in any way connected with the interisland transport service. In the amount shown as the total cost of the interisland transport service proper, there is included 50 per cent of the pay of the entire clerical force at the Manila depot, 75 per cent of the pay of all checkers employed, and the total cost of all other labor engaged in loading and unloading, or in any other way connected with the interisland transport service.

As in the ocean service, so in the interisland, aside from the question of cost, the kind of service that could reasonably be expected from the

commercial companies (their present equipment considered) is unsuited to the needs of the Army. The accommodations available for enlisted men on the boats now operated among the islands are not such as the American people expect their Army to be provided with. The service is irregular, which is objectionable, as a primary object is regularity and frequency in the delivery of supplies.

Leaving out of the question altogether the privilege of transportation accorded to the immediate families of officers, enlisted men, and civilian employees, and assuming that commercial lines would so equip their ships as to furnish reasonably satisfactory accommodations for enlisted men and suitable hospitals for the care of the sick, it is not believed that it would be practicable to obtain a contract for interisland service at rates which would enable the department to transact its business more economically than under the present system unless authority should be granted by Congress for the entering into such contracts for a term of from three to five years, preferably the latter. Steamship men say, and very reasonably, that to justify their incurring the expense of equipping their companies for this business would require that they have assurance of getting the business for a longer term than one year, as the company which obtained the first one-year contract, even if the department should dispose of its own vessels, might lose the business at the expiration of the twelve months by being underbid. A long term contract would also be advantageous to the Government although it could be protected against an unreasonable increase in rates, when it no longer owned vessels, by securing an option for the renewal of the contract from year to year.

THE TRANSPORT SERVICE AN ECONOMICAL MILITARY CONVENIENCE.

It has been thought proper, in an official report, to refer to the army transport service as "a most costly luxury." As to its costliness, I submit the actual figures and facts hereinbefore set forth. I do not know in what respect the service can be looked upon as a luxury, unless reference is made to the excellence of the enlisted men's accommodations. If it be a luxury to furnish our enlisted men with the class of accommodations now provided on all of the army transports, then I favor the continuance of that luxury.

It has also been remarked that the service is "defended or excused on the ground of inexorable military necessity." In my opinion, the transport service needs no defense whatever, and no excuse is offered for it by the Department charged with its operation. I, for one, do not claim that there is any "inexorable military necessity" for its continuance, but I submit that the service is unquestionably a very valuable and economical military convenience.

I venture to say that not an officer who has had duty in the Philippine Islands, and expects ever to see further service there, and who has given the matter any thought at all, will be found to favor the abolishment of the army transport service either in its transoceanic or interisland branches.

BARRACKS AND QUARTERS.

It is safe to say that a vastly greater amount of construction work was planned, undertaken, and contracted for during the fiscal year 1902-3 than during any previous year in the history of the Army.

The Construction and Repair Division of this office is burdened with work to such an extent that it is physically impossible to keep it from falling in arrears. The regular corps of architects and draftsmen, augmented by a number temporarily employed in the department at large, are pushed to the utmost to keep abreast of the demands upon it. The clerical force is numerically inadequate under existing conditions to do the work connected with the handling of estimates, obtaining necessary allotments, preparing specifications, the issuing of instructions calling for bids, the decision on bids, and the awarding of contracts.

It is not practicable to give a better idea of the construction work of the department than can be obtained from the following statement showing the use of appropriations for construction work without adding a detailed statement of such work, showing posts and buildings, which is too voluminous for this report:

BARRACKS AND QUARTERS APPROPRIATION.

Congress, in the act making appropriations for the support of the Army for the fiscal year 1903, provided under the head of "Barracks and quarters"..... \$3,350,000.00

Expenditures have been made or authorized from this appropriation approximately as follows:

Authorized for construction and repair of buildings at army posts and general depots in the United States.....	\$2,796,579.04
Expended for rents and for hire of employees in the United States....	293,326.34
Remitted for shelter of troops in Peking.....	590.00
Remitted for storehouses, etc., in the Philippines.....	259,498.05
Total	3,349,993.43
Balance unallotted.....	6.57
Total accounted for	3,350,000.00

MILITARY POST APPROPRIATION.

In the sundry civil act approved June 28, 1902, Congress appropriated under the head of "Military posts" \$2,000,000. There was an available balance of \$31,341.21 carried forward from the military posts appropriation of the preceding year, making a total of \$2,031,341.21 available for expenditure in the fiscal year 1902-3. Of this amount the sum of \$1,969,516.16 has been apportioned to various posts.

POST EXCHANGES.

The army act contained an appropriation of \$500,000 for the construction, equipment, and maintenance of suitable buildings at military posts and stations for the conduct of post exchange, school, library, reading, lunch, amusement rooms, and gymnasiums. Plans were prepared in this office, contracts awarded, and work commenced before the close of the fiscal year on the construction of post exchange and gymnasium buildings at twelve posts. Work of remodeling existing buildings at five other posts to provide post exchanges and gymnasiums was commenced before the close of the fiscal year. Small allotments were made for repairs to buildings, gymnastic apparatus, etc., at various posts. Of the \$500,000 appropriation there was

allotted the sum of \$485,299.15, leaving a balance of \$14,700.85. This balance will be required for proposed work at one or more posts, extras under original contracts for construction.

HOSPITALS.

Of the \$150,000 appropriation for the construction and repair of hospitals there was a balance of \$544.79 at the close of the year, and of the \$15,000 appropriation for hospital stewards' quarters a balance of \$153.99.

OTHER APPROPRIATIONS USED FOR CONSTRUCTION.

There were expended, through the construction and repair division, \$255,635.49 of the "Regular supplies" appropriation for heating and lighting apparatus, construction of bakeries, bake ovens, and coal sheds, building and repairing reservation fences, etc.; \$2,786,080.40 of the "Army transportation" appropriation for plumbing, drainage, water and sewer systems, roads, walks, bridges, wharves, boathouses, and miscellaneous purposes in connection with construction and repair work; \$54,232.82 of the appropriation for "Incidental expenses" for lockers, flagstaffs, refrigerators, electrical supplies, etc.

In addition to the foregoing a number of special appropriations for construction, aggregating \$433,207.28, designating the military post at which the sums appropriated were to be expended, were used during the year.

APPROPRIATION FOR BARRACKS AND QUARTERS, PHILIPPINE ISLANDS.

In the army act for the fiscal year 1903, Congress also appropriated "for the proper shelter and protection of officers and enlisted men of the Army of the United States lawfully on duty in the Philippine Islands, including the acquisition of title to building sites where necessary, to be expended in the discretion of the President, and to be immediately available"	\$1, 500, 000. 00
In the deficiency act approved March 3, 1903, there was appropriated "for continuing the work of providing the proper shelter and protection of officers and enlisted men of the Army of the United States lawfully on duty in the Philippine Islands, including the acquisition of building sites where necessary, and including also shelter for animals and supplies, and all other buildings necessary for post administrative purposes"	250, 000. 00
Total	1, 750, 000. 00
From this amount there was remitted to the Philippine Islands, for construction, repairs, and rents, to June 30, 1903	\$1, 295, 923. 33
Expended for lumber and other building materials purchased in the United States and shipped or to be shipped to Manila, P. I., for construction and repair work in the Philippines	393, 885. 84
Total	1, 689, 809. 17
Balance June 30, 1903	60, 190. 83
Total accounted for	1, 750, 000. 00

The army appropriation act for the current fiscal year appropriates \$500,000 for "Barracks and quarters, Philippine Islands," in addition to the \$1,750,000 above shown.

NATIONAL CEMETERIES.

During the year 1,865 interments were made in national cemeteries.

DISINTERRING CORPS.

A disinterring corps of 7 undertakers and embalmers was sent to the Philippine Islands last fall to resume the work of exhuming and shipping remains which had been suspended the previous year owing to the cholera epidemic. This corps upon arrival in the Philippines was placed under the charge of a member of the first corps sent out some years ago, and before the end of the year had visited 100 stations, and 17 islands in the archipelago. Many of these places are no longer garrisoned by troops, and will not have to be visited again, but in view of the number of stations which will be permanently occupied, it will no doubt be necessary to maintain a permanent disinterring corps in the islands.

During the year there were received in the United States from various stations 492 remains, 235 of which were delivered to relatives of the deceased, and the remaining 257 buried in national cemeteries.

NEWSPAPERS AND PERIODICALS FOR ENLISTED MEN.

During the fiscal year newspapers and magazines have been supplied for the enlisted men at all posts in the United States, Cuba, Porto Rico, Hawaii, and to the legation guard at Peking, China, at a cost of \$4,816.15, and to the enlisted men serving in the Philippine Islands at a cost of \$2,384.

CLAIMS.

By act of Congress approved February 27, 1902, the sum of \$50,000 was appropriated, and by the army appropriation bill approved March 3, 1903, there was appropriated a further sum of \$50,000 for the purpose of paying claims of artillery and cavalry officers and private soldiers of the Confederate army for horses, side arms, and baggage alleged to have been taken from them by Federal troops at and after the surrender at Appomattox, acting under orders in violation of the terms of surrender. Up to the close of the year 309 of these claims had been approved and paid. In addition to these there were received at this Office 1,288 claims. The work of collecting and considering the evidence bearing upon these claims and making ready for the settlement of them in accordance with the instructions issued by the Secretary of War is now being pushed as rapidly as possible. As this work is in addition to the labor connected with the great number of miscellaneous claims requiring the action of this Office year after year, the branch of the office having that work in charge has not been able to keep the work from falling behind.

DIVISION OF THE PHILIPPINES.

At this writing the annual report of the chief quartermaster, Division of the Philippines, for the year ended June 30, 1903, has not been received. As stated hereinbefore, upon retiring from that office I submitted to the commanding general of the division, under date of March 31, 1903, a report of the operations of the Quartermaster's Department in the archipelago from the beginning of the fiscal year

to, approximately, March 20, the date of my relief. Under the circumstances, therefore, it is not possible to include in this report data pertaining to the Philippines to the close of the year except as regards the transport service, data as to which has been obtained from the annual report of the officer immediately in charge of that service at Manila, which report was received at this office some weeks ago.

At the present time the principal duties devolving on the Quartermaster's Department in the Philippines are in the direction of providing comfortable and sanitary quarters for officers and enlisted men, in seeing to it that they receive promptly and regularly the articles of the ration and sales stores, in providing them with adequate clothing and camp and garrison equipage, and in arranging so that paymasters may be able to reach them with regularity.

The very important problem of furnishing the soldiers on duty in the islands with fresh beef and other perishables has been solved by the Quartermaster's Department in a way that it is believed will be satisfactory to all concerned. The refrigerator transports *Seward* and *Wright* are both actively engaged in work. Supplementing these, ice boxes have been placed on a number of commercial vessels (something they never had before) and on all the chartered transports. Until better arrangements can be made, refrigerators have been constructed at the quartermaster's shops in Manila and sent to several stations. At some posts cold storage has been provided by building insulated chambers connected with the ice machines formerly belonging to the Medical Department, but recently transferred to the Quartermaster's Department. Plans for the construction of permanent cold storage, using the surplus refrigerating power of these machines, were prepared and submitted to the division commander before I left Manila.

The next most important matter engaging the attention of this department in the Philippines is the construction of permanent barracks and quarters for troops. For this purpose the sum of \$1,500,000 was appropriated by Congress in the army appropriation bill of last year, and this sum has been supplemented by an appropriation of \$250,000 in the deficiency act approved March 3, 1903, and \$500,000 in the army appropriation act for the current fiscal year.

PORT WILLIAM M'KINLEY.

In the urgency deficiency act approved February 14, 1902, \$500,000 was appropriated for the establishment of a military post in the vicinity of Manila, and the sundry civil act approved March 3, 1903, appropriated \$1,000,000 additional for continuing this work. Under General Orders, No. 112, Headquarters of the Army, Adjutant-General's Office, October 28, 1902, this post was named Fort William McKinley. At the end of the fiscal year land had been purchased for this post at a cost of \$54,675, and \$41,723.68 had been expended in clearing and grading, construction of roads, bridges, wharf, and buildings as far as advanced at that time. Lumber and other materials for the construction of this post have been purchased in the United States and shipped to Manila from San Francisco, Cal.; Portland, Oreg.; Seattle and Tacoma, Wash., and New York City. The total quantity of lumber ordered purchased has been 7,630,360 feet, and the total cost of all materials for which contracts were awarded in the United States up to June 30, 1903, was \$235,616.95.

The construction of Fort William McKinley is progressing as rapidly as practicable.

IN GENERAL.

The work of the Quartermaster's Department in the Philippine Islands during the greater part of the fiscal year is detailed in my report as chief quartermaster of the division, rendered March 31, 1903, hereinbefore mentioned, to which report anyone interested is referred. In general it may be stated that while the year was dull so far as military operations were concerned, it was active in settling affairs left over from the insurrection and in making provisions for the comfort and well-being of the troops in the islands. As was to be expected, many articles of supply which were not furnished troops in field service are now required because of their being moved into permanent posts. On the whole there was no noticeable lessening in the work of the department.

In my annual report for 1902 I strongly urged the classification, under civil service rules, of the worthy employees of the department serving in the Philippines, and it is very gratifying to know that steps have been taken which insures this being done within the next few months. Many of the civilian employees serving in the Philippines have had from three to five years foreign service. Their duties in most cases have been exceedingly arduous and they have worked early and late, knowing neither office hours, Sundays, nor holidays, and they deserve relief from tropical service. Except in the few cases where such employees were included in the regular classified service, return to the United States meant loss of employment. In my opinion a system of transfers should be inaugurated whereby clerks and other employees who have served at foreign stations for a stated period, say three years, shall be relieved by employees sent from stations in the States whose positions could be filled by those returning to the United States, and those thus sent to the islands in turn to be relieved at the expiration of a similar period. I am glad to know that this matter is now receiving the consideration of the War Department and the United States Civil Service Commission.

QUARTERMASTER-GENERAL'S OFFICE.

The total authorized force of this Office June 30, 1903, was 207, not a sufficient number to keep up to date the present work of the office. Steps were taken before the end of the year looking to the decentralization in some measure of the business methods of the Quartermaster's Department. It is only necessary for me to state that during the year there were received in this office 149,431 pieces of mail, and mailed from here 122,062 letters, indorsements, etc., to show that a great deal is acted upon in this office that could well be left in the hands of the authorities of the several military departments and divisions. Early in June this office took steps to bring about the decentralization so much desired. It was considered (1) that chief quartermasters of the various military departments and divisions should have authority to award contracts for supplies required in their respective departments immediately upon the opening of bids, said contracts to be approved by the commanding general without first referring bids to this office for award or sending contracts here for approval. Before the publication of this report this change had been effected. (2) Authority should be given chief quartermasters, under the direction of department commanders, to make expenditures in their respective

departments, not to exceed \$200 in any one case, without first obtaining authority from this office, such expenditures of course to be reported. Since the close of the year, but prior to the date of this report, this office recommended the granting of this authority, and hopes it soon will be, as there is no doubt that it would be the means of greatly expediting and facilitating business. (3) Chief quartermasters, with approval of department commanders, should be allowed to make requisitions for regulation supplies required at posts in their departments direct on the quartermaster's depot, within or nearest the geographical limits of their departments.

The inauguration of the foregoing will result in a very considerable reduction in the work required in the Quartermaster-General's Office.

I believe that there is a smaller percentage of clerks receiving the pay of the higher grades in this Office than in any other bureau. With the single exception of the chief clerk the highest pay is \$1,800 per annum, and of the 207 employees there are only 11 clerks receiving \$1,800, and only 9 receiving \$1,600. It can readily be seen what little opportunity for promotion live, energetic, and efficient clerks have. Good work deserves good compensation, and the best service is to be expected from clerks who can look forward to receiving reward in the way of promotion. While the force is not large enough to prevent the volume of work from sometimes falling behind, I find that there are employees in this office who often voluntarily remain at work after office hours. It has come to my attention that a number of clerks seek and many secure transfers to other departments after they have been here a sufficient length of time to become proficient in the work of and valuable employees in this office. Having in mind the best interests of the Department, I had decided to disapprove applications for transfers, but in every case it has been shown that the employees desiring the transfer had received assurance of promotion in the Department to which transfer was desired, and, on the principle that it would not be just to stand in the way of the clerk's advancement, the chances of which are so poor here, the transfers have generally been approved. There are, of course, in this as in every office, clerks whose services deserve no better pay than they are receiving, but there are many employees in this office engaged on important and technical classes of work whose salaries are much below what their valuable and efficient services merit. It is hoped that in the near future the force of the Quartermaster-General's Office may be so graded that there will be a more equitable percentage of the higher-grade salaries allowed to it.

PERSONNEL OF THE DEPARTMENT.

I have been fortunate in having had ample opportunity to observe the work of the Quartermaster's Department at large, and especially in the new possessions under conditions entirely new to our Army. Therefore it is with pleasure that I mention here that the officers of this Department are, with few exceptions, hard-working, energetic, faithful, and efficient, bringing to the discharge of their duties ability and intelligence of a high degree.

C. F. HUMPHREY,
Quartermaster-General, U. S. Army.

The SECRETARY OF WAR.

REPORT OF THE COMMISSARY-GENERAL.

WAR 1903—VOL 2—3

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REPORT OF THE COMMISSARY-GENERAL.

WAR DEPARTMENT,
OFFICE OF THE COMMISSARY-GENERAL,
Washington, D. C., October 10, 1903.

SIR: I have the honor to submit the following report of the operations of the Subsistence Department for the fiscal year ending June 30, 1903:

RESOURCES, EXPENDITURES, AND BALANCES.

The following statement exhibits the aggregate fiscal resources and expenditures of the department and the balances at the close of the fiscal year 1903:

RESOURCES.

Relief of citizens of the French West In- dies, act ap- proved May 13, 1902.	Subsistence of the Army, cer- tified claims, 1902.	Subsistence of the Army, cer- tified claims, 1902.	Subsistence of the Army, 1900 and prior years.	Subsistence of the Army, 1901.	Subsistence of the Army, 1902.	Subsistence of the Army, 1908.
Amounts in Treasury to credit of appropriations of the Subsistence Department, June 30, 1902.....						
Amount included in balances of last fiscal year, erroneously credited as a refund- ment to this appropriation.....				\$2,999,274.57	\$5,985,664.17	
Amounts which were reported in last annual report as being to credit of officers of Subsistence Department and of officers doing duty in that department with the Treasurer, assistant treasurers, designated depositaries, and in their personal possession on June 30, 1902.....	\$4,415.44					
Amount of war appropriation warrant No. 13 (in part), "for the money value of subsistence stores delivered to U. S. collier Sterling by Capt. J. T. Crabbs, quar- termaster, U. S. Army, May 13, 1902, for the 'Relief of citizens of the French West Indies,' being due appropriation 'Subsistence of the Army, 1902,' on set- tlement 25878, Auditor for the War Department, July 31, 1902.....	1,948.01		\$20,827.74	107,657.43	810,354.72	
Amounts appropriated for subsistence of the Army for fiscal year ending June 30, 1903.....						
Act of June 30, 1902.....						\$11,000,000.00
Deficiency act approved July 1, 1902.....						
Deficiency act approved Mar. 3, 1903.....		\$230.02	\$2,608.94	2,647.67		
Amounts collected from various sources and refunded to appropriations of Sub- sistence Department on the books of the Treasury during the fiscal year 1903.....						
Unexpended balance "Relief of citizens of the French West Indies," inadvertently covered into appropriation "Subsistence of the Army, 1902," by certificate of deposit 1855, dated June 17, 1902, in favor of Maj. D. L. Brainard, commissary of subsistence, and transferred by settlement 26051 of Auditor for the War De- partment, Aug. 12, 1902.....	4,416.44					
Amounts charged against officers on account of funds alleged to have been lost by theft, etc., for which relief can only be obtained in the Court of Claims, un- der sections 1059 and 1062, Revised Statutes, or from Congress, as follows: Officers still in service.....						
Officers out of service.....				2,155.59	959.04	
Amounts received by officers of Subsistence Department and by officers doing duty in that department from sales of stores during fiscal year 1903 and taken up for immediate disbursement.....			314.47	2,375.61	149,859.78	2,641,954.59
Amounts taken up by officers doing duty in Subsistence Department on account of refunds and reclamations for stores lost, damaged, etc., in correction of errors in their accounts, etc., during above period.....			1.00	456.09	3,072.22	3,671.08
Amount taken up by officers as gains.....					58.74	
Amount taken up by officers unexplained.....				2,697.68	2,447.05	1,801.44
Total resources.....	10,780.89	230.02	2,608.94	35,156.30	7,053,275.64	13,726,788.80

EXPENDITURES.

Amounts expended on the books of the Treasury from the appropriations of the Subsistence Department during the fiscal year 1903.....	\$1,948.01	\$230.02	\$2,608.94	\$2,692.66	\$9,580.26	\$287,318.68	\$247,384.99
Amounts disbursed by officers of the Subsistence Department and officers doing duty in the Subsistence Department during the fiscal year 1903.....				653.27	8,352.23	196,679.37	7,276,082.49
Amounts dropped by officers doing duty in the Subsistence Department, in correction of errors in their accounts during the fiscal year 1903.....					64.89	413.33	454.95
Amounts carried to the surplus fund on June 30, 1903 (act, June 20, 1874).....				11,520.43	8,106,674.01		
Dropped from amount reported in the Treasury June 30, 1902, by erroneous deposit; should have been carried to appropriation, "Relief of citizens of the French West Indies".....						4,416.44	
Amount of balances unaccounted for by officers whose accounts are in process of settlement.....				16,009.43			
Dropped, error in entry of docket 20153, Sept. 12, 1902.....							71.36
Amounts charged against officers on account of funds alleged to have been stolen, etc., now dropped from this financial statement.....				4,480.51	2,155.59	959.04	
Total expenditures.....	1,948.01	280.02	2,608.94	35,156.30	3,125,886.96	489,736.86	7,528,983.79

BALANCES.

Amounts in the Treasury to the credit of the appropriation of the Subsistence Department, June 30, 1903.....	\$8,832.88					\$6,412,286.20	\$6,085,496.01
Amounts to the credit of officers of the Subsistence Department and of officers doing duty in the Subsistence Department with the Treasurer, assistant treasurers, designated depositaries, and in their personal possession, per the latest accounts received to June 30, 1903.....					\$5,084.20	92,249.68	1,110,410.75
Amounts refunded to the Treasury near close of fiscal year 1903, but not carried to the credit of the appropriations by June 30, 1903.....						55,975.99	56,178.66
Amounts charged against officers on account of funds alleged to have been lost by theft, etc., for which relief can only be obtained in the Court of Claims, under sections 1069 and 1062, Revised Statutes, or from Congress, as follows: Officers still in service.....						2,964.91	710.59
Total balances.....	8,832.88				5,084.20	6,563,488.78	6,202,795.01

In the expenditures above reported for the fiscal year 1903 the following items of disbursement are included: Commutation of rations to cadets at the Military Academy, West Point, \$45,361.80; to enlisted men on furlough, \$71,500.65; to ordnance-sergeants of posts not garrisoned, \$2,701.10; to enlisted men on duty where rations could not be issued conveniently, \$76,606.30; to enlisted men while traveling, \$34,459.60; to enlisted men in Army and Navy Hospital, Hot Springs, Ark., \$9,909.96; commutation of fresh vegetables, \$5,290.95; meals for recruiting parties and recruits and troops moving, \$145,692.45; liquid coffee for troops traveling, \$23,095.19; salaries to civil employees of Subsistence Department at posts and stations, including wages of laborers and mechanics, fees of inspectors, and miscellaneous small employments, \$293,744.91; salaries of civil employees of Subsistence Department on transports, \$208,700.34; board wages of civil employees of Subsistence Department connected with the transport service while ashore, \$8,761.60; extra-duty pay, \$24,982.78; advertising, \$3,410.73; commercial newspapers, \$30.60; printing, \$2,656.60; rent of telephones, \$1,832.45; ice for issue to troops and for refrigerating purposes (18,579,380 pounds), \$93,206.54.

The following items of disbursement were made in the fiscal year 1902, but could not be included in the report for that year by reason of the delay in receiving the accounts at this office: Commutation of rations to enlisted men on furlough, \$7,673.25; to ordnance sergeants of posts not garrisoned, \$84; to enlisted men on duty where rations could not be issued conveniently, \$4,527; to enlisted men while traveling, \$469.25; to enlisted men in Army and Navy Hospital, Hot Springs, Ark., \$808; commutation of fresh vegetables, \$741.96; meals for recruiting parties and recruits and troops moving, \$5,133.44; liquid coffee for troops traveling, \$1,640.32; salaries to civil employees of Subsistence Department at posts and stations, including wages of laborers and mechanics, fees of inspectors, and miscellaneous small employments, \$2,872.65; salaries of civil employees of Subsistence Department on transports, \$13,065.98; board wages of civil employees of Subsistence Department connected with the transport service while ashore, \$430.75; extra duty pay, \$5.87; advertising, \$660.86; printing, \$1,214.80; rent of telephones, \$94.85; ice for issue to troops and for refrigerating purposes (4,237,012 pounds), \$21,974.40.

HOSPITAL ISSUES.

The supplies purchased and issued from stock on hand during the fiscal year for enlisted men in hospital, too sick to use the army ration, amounted in value to \$373,728.85.

Like issues were made in fiscal year 1902, amounting in value to \$12,714.88, but not included in said report owing to the delay in the receipt of the accounts and returns at this office.

Issues of articles differing from those of the ration to enlisted men in camp in the United States, during periods of recovery from low conditions of health, consequent upon service in unhealthy regions or in debilitating climates, aggregated in value \$17,779.19.

CYCLONE AND FLOOD SUFFERERS.

Upon the urgent request of the State authorities of Georgia, South Carolina, and Kansas, which were visited during June by disastrous

cyclones and floods, rations were issued to persons who were made destitute on account of these visitations, as follows:

On account of cyclone at Gainesville, Ga., rations to the value of \$388.20 were issued; at New Holland, Ga., rations to the value of \$309.35, and at Spartanburg, S. C., rations to the value of \$485.62.

On account of floods, rations were issued at Fort Riley, Kans., to the value of \$17.72; at Ogden, Kans., rations to the value of \$29.82; and at Kansas City, Kans., rations to the value of \$1,231.79.

VALUE OF STORES ISSUED AND TRANSFERRED TO SAILORS AND OFFICERS OF THE NAVY, 1903.

Subjoined is a statement of the value of subsistence stores issued to sailors and others, and transferred to officers of United States Navy, and of amounts of same that have been paid for:

	Value.	Collected.
Issued on transport Sheridan (1 man).....	\$4. 75	.....
Issued on transport Thomas (3 men).....	27. 75	\$27. 75
Issued on transport Thomas (7 men).....	71. 83	.....
Transferred to navy paymaster on island of Guam by sundry officers of United States Army on transports, etc.....	21, 923. 86	21, 923. 86
	22, 028. 19	21, 951. 61
Balance due and uncollected.....		76. 58

Transfers have been reported as made to the navy paymasters on duty on island of Guam by the commissary at San Francisco, Cal., in April, May, and June, 1903, but as the receipts of the officers receiving the stores have not yet come to hand, claims for the stores have not yet been made on the Navy Department.

VALUE OF STORES ISSUED AND TRANSFERRED TO SAILORS AND OFFICERS OF THE NAVY IN FISCAL YEAR 1902.

For sailors of United States Navy on transport Thomas, in June, 1902.....		\$21. 00
For sailors of United States Navy on transport Warren, in May, 1902.....		37. 50
For sailors of United States Navy on transport Warren, in June, 1902.....		45. 00
Transfer to Paymaster Pyne, U. S. Navy, on island of Guam, in April, 1902.....	\$2, 261. 43	2, 261. 43
Transfer to Paymaster Pyne, U. S. Navy, on island of Guam, in June, 1902.....	6. 20	6. 20
Transfer to pay inspector, United States Navy, on island of Guam, in January, 1902.....	7. 94	7. 94
	2, 275. 57	2, 379. 07

The difference between the debit and credit items is due to the fact that the debit difference was entered in the report of the fiscal year 1902.

Claims have been made on the Navy Department for the value of the stores issued and transferred as above that have not yet been paid.

**VALUE OF STORES ISSUED AND TRANSFERRED TO MARINES AND OFFICERS
OF MARINE CORPS.**

Below is a statement of the value of subsistence stores issued to marines and transferred in bulk to officers of the Marine Corps, for issue to marines, and of amounts collected on account of same:

	Amount.	Collected.
On transport Thomas	\$540.19	\$325.25
On transport Sheridan	2,278.36	.....
On transport Sherman	7.50	.....
At Pollock, P. I.	3,537.83	1,418.48
At Isabela de Basilan, P. I.	6,872.23	5,352.24
At Bacoor, P. I.	4,088.12	4,088.12
At Cavite P. I.	45,827.51	31,158.90
At San Juan, P. R.	5,733.48	4,563.18
	<u>68,885.22</u>	<u>46,906.17</u>
Balance due and uncollected		21,979.05

Claims have been made on the Navy Department for such of the above sums as are still due, nearly all of which have been reported to the Auditor for the Navy Department for favorable action.

**VALUE OF STORES ISSUED AND TRANSFERRED TO MARINES AND OFFICERS,
MARINE CORPS, IN FISCAL YEAR 1902.**

The following is a statement of the value of subsistence stores issued to and transferred for use of marines in fiscal year 1902, the evidence of which was received too late to appear in the annual report of that year, and of the amounts received in current fiscal year in settlements made:

Issued and transferred.	Value.	Collected.
For marines at—		
San Juan, P. R., in May and June, 1902		\$303.70
Tacloban, P. I., in December, 1901		3.60
Cavite, P. I., in—		
February, 1902		2,080.64
March, 1902		2,306.46
April, 1902		3,719.11
May, 1902		2,973.14
Olongapo, P. I., in—		
February, 1902		2,788.00
March, 1902		1,002.82
April, 1902		1,881.52
May, 1902		915.83
Parang, P. I., in—		
November, 1901		230.91
December, 1901		192.01
Malebrigo light-house, P. I., in May, 1902		8.99
Basey, P. I., in—		
November, 1901		201.68
February, 1902	\$483.51	.....
Balaboc, P. I., in September, 1901		143.97
Bacoor, P. I., in—		
February, 1902		527.23
February, 1902		200.52
February, 1902	22.20	22.20
March, 1902		1,313.05
April, 1902		202.02
April, 1902	115.63	115.63
May, 1902		167.34
May, 1902	15.77	15.77
May, 1902		17.08
May, 1902		47.63
June, 1902		<u>460.31</u>

Issued and transferred.	Value.	Collected.
For marines at—		
Pollock, P. I., in—		
August, 1901.....		\$32.44
November, 1901.....		2.90
December, 1901.....		8.80
February, 1902.....		28.88
March, 1902.....	\$70.86	70.86
March, 1902.....	89.49	89.49
April, 1902.....	84.49	84.49
April, 1902.....	182.66	182.66
May, 1902.....	125.81	125.81
June, 1902.....	197.48	197.48
Pambujan, P. I., in December, 1901.....	198.94	198.94
Balangiga, P. I., in October, 1901.....	2,966.00	
In the field at Quinapundan, P. I., in January, 1902.....	218.49	
For marines in the field at Quinapundan, P. I., in February, 1902.....	224.72	
For marines at—		
Isabela de Basilan, P. I., in October, 1901.....		968.29
Isabela de Basilan, P. I., in February, 1902.....		394.97
Isabela de Basilan, P. I., in March, 1902.....		536.94
Isabela de Basilan, P. I., in May, 1902.....	849.87	849.87
Isabela de Basilan, P. I., in June, 1902.....	728.08	728.08
Isabela de Basilan, P. I., in June, 1902.....	515.86	515.86
For marines—		
On transport Hancock, in March and April, 1902.....		1,069.25
On transport Sheridan, in April, 1902.....		1,086.25
On transport Sherman, in April and May, 1902.....		650.00
On transport Warren, in May, 1902.....		2,272.70
On transport Warren, in June, 1902.....		906.75
On island of Guam, in August, 1901.....		966.84
Total.....	7,039.30	84,247.10

The difference between the debit and credit items is due to the fact that the debit difference appeared in the annual report of fiscal year 1902.

VALUE OF ISSUES TO CONVICTS, SCOUTS, DESTITUTES, ETC.

The following is a statement of the value of subsistence stores issued to Filipino convicts, civil scouts, native scouts, destitutes, civil employees (linemen of the Signal Corps), for which no reimbursement has yet been made to the Subsistence Department from public civil funds of the Philippine Islands:

	Fiscal years—			Total value.
	1901.	1902.	1903.	
Convicts.....	\$7,408.42	\$17,247.78	\$8,474.07	\$28,130.22
Civil scouts.....		3,284.98		3,284.98
Native scouts.....	62,192.60	80,143.54		92,836.04
Destitutes.....	1,468.82	3,837.52	2,804.48	8,110.82
Civil employees (linemen of the Signal Corps).....		3,296.99	5,381.82	8,678.81

Value of issues to Indians.

Apache Indians at Fort Sill, Okla.....	\$11,055.71
Chiricahua Indian at Fort Grant, Ariz.....	62.01
Seminole-Negro Indian at Fort Clark, Tex.....	65.15
Indians in Alaska.....	66.69
Chippewa Indians at Fort Assinniboine, Mont.....	11.29

Value of issues to civil employees.

Civil employees (Quartermaster, Commissary, Ordnance, and Medical departments, and the Signal Corps).....	\$251,976.81
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Value of miscellaneous issues.

Military prisoners at posts (general prisoners).....	\$87,885.03
Filipino insurgent prisoners captured and in arrest.....	549.30
Filipino military convicts.....	242.64
Destitute citizens in United States.....	5.09
Destitute citizens in Alaska.....	7.62

The following issues were made in fiscal year 1902, but not included in said report, the returns of subsistence stores being delayed in arriving in this Office:

Filipino insurgent prisoners captured and in arrest.....	\$4,230.56
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VALUE OF STORES SUPPLIED VARIOUS PARTIES AND COLLECTIONS THEREFOR.

Below are a number of miscellaneous cases where stores were reported supplied to various parties and the amounts collected in connection therewith:

	Amount.	Collected.
To Commissary Clerk G. A. Nunes, by Capt. H. P. Young, quartermaster, in July, 1902.....	\$29.00	\$29.00
To sundry parties, by Capt. H. P. Young, quartermaster, in October, 1902.....	85.50	.....
To Medical Department, by Capt. W. H. Palne, Seventh Cavalry, in July, 1902.....	40.53	40.53
To destitute seaman (Mathias Wagner) on transport Crook, in November, 1901.....	5.00	5.00
To 9 destitute seamen on transport Sheridan, in October, 1901.....	45.00	45.00
To paymaster's clerk and family, by Capt. R. L. Brown, quartermaster, on transport Sherman, in December, 1902.....	98.75	98.75
To ordnance employee, by Capt. D. W. Arnold, quartermaster, on transport Kilpatrick, in July, 1902.....	41.00	41.00
To Mr. George F. McDonald, by Capt. H. P. Young, quartermaster, on transport Sheridan, in September, 1902.....	37.50	37.50
To hospital steward and family, by Capt. J. de L. Lafitte, on transport Crook, in September, 1902.....	48.00	48.00
To 2 insular employees, by Capt. J. de L. Lafitte, on transport Crook, in September and October, 1902.....	96.00	96.00
To sundry laborers, by Capt. J. de L. Lafitte, on transport Crook, in December, 1902.....	74.00	74.00
To 2 civilian clerks, by Capt. Abe S. Bickham, quartermaster, on transport Logan, in November, 1902.....	56.66	56.66
To insular employee, by Capt. H. P. Young, quartermaster, on transport Sheridan, in January, 1903.....	37.50	37.50
To wife of Private Charles Dusenberry, by Capt. H. P. Young, quartermaster, on transport Sheridan, in March, 1902.....	40.50	.....
To — (not indicated), by Capt. R. L. Brown, quartermaster, on transport Sherman, in December, 1902.....	39.50	39.50
	774.44	648.44
Balance due and uncollected.....		126.00

The following miscellaneous issues and payments therefor, made in the fiscal year 1902, were received too late to appear in report of prior fiscal year:

	Value.	Collected.
To school-teachers en route to Manila, P. I.....	\$14,196.00	\$14,196.00
To Noble Carter, school-teacher.....		23.50
To Medical Department.....	23.10	23.10
Total.....	14,219.10	14,242.60

The collection of \$23.50 in excess of the amount reported above as due is caused by that sum having been included in a debit item of \$45 appearing in report of prior fiscal year, of which sum \$21.50 was reported in that year as collected.

SALES OF SUBSISTENCE STORES.

The amounts received from sales of subsistence stores during the fiscal year are classified as follows:

From whom or on what account received.	Subsistence of the Army.		
	1901.	1902.	1903.
To officers	\$709.85	\$24,666.28	\$711,206.77
To enlisted men, companies, detachments, and hospitals.....	2,235.86	85,096.45	1,239,260.45
To civilians	80.40	8,953.97	195,201.45
At auction.....		447.73	26,446.19
To Quartermaster's Department.....		11.69	2,271.00
To post exchange		336.76	80,706.31
To Indians			48.13
To Indian agents and employees.....			8,350.97
To meals on transports		7,697.89	169,991.44
To naval officers and enlisted men.....			80,891.88
To post bakery		4.92	296.11
To natives (Filipinos)		27,594.71	123,921.52
To post laundry			26.19
To court officers (Alaska)			451.73
To special sales.....		49.83	1,613.97
To United States Coast and Geodetic Survey			1,287.96
Total	2,975.61	149,859.73	2,636,967.07

The accounts containing reports of amounts received for sales of stores in the fiscal years 1901 and 1902 were not received in this office in time to appear in the annual reports of those years.

SALES ON CREDIT.

Sales on credit to officers of the Army during the fiscal year ended June 30, 1903, as shown by the accounts of that year thus far received, amount to \$19,351.01, and the sums thus far reported as collected through the Pay Department and otherwise settled amount to \$15,117.25, leaving the sum of \$4,233.76 yet to be collected.

Of the amount due from officers in the prior fiscal year, the sum of \$3,162.26 has been reported as collected.

The sales on credit to the enlisted men of the Army amount to \$13,948.51; the collections by the Pay Department on muster and pay rolls and on final statements on account of credit sales amount to \$13,962.89. The amount collected in excess of the debit is undoubtedly caused by collections creditable to prior years not being so reported.

Sales on credit to enlisted men of the Army during the previous fiscal year, not heretofore reported by reason of delay in receipt of accounts, amount to \$353.34, and the collections through the Pay Department amount to \$10,404.34, leaving still to be collected on account of credit sales in that year \$3,118.88.

LOSSES OF SUPPLIES.

The value of subsistence stores lost throughout the department in the fiscal year 1903, according to returns so far received, amounted by ordinary wastage to \$22,361.05; from natural causes to \$351,953.03; by certificate to \$4,283.59; by theft to \$1,288.38; by fire to \$109.84; and from miscellaneous causes to \$1,719.51. The total value of subsistence property lost according to returns so far received was \$3,804.31.

Of this amount property to the value of \$551.16 was acted on by boards of survey, and \$3,253.15 did not have the action of boards of survey.

Like losses which occurred during previous fiscal years, found in delayed returns, and consequently not included in the annual reports of those years amounted to \$13.94 in the fiscal year 1899; \$204.57 in 1900; \$3,321.02 in 1901, and \$10,738.33 in 1902.

The value of supplies lost where responsibility was fixed amounted to \$10,567.61, of which there has been collected \$8,121.24, leaving a balance of \$2,446.37 not yet collected. Of losses in the previous fiscal year, the sum of \$2,498.84 has been collected.

POST COMMISSARY SERGEANTS.

The number of post commissary sergeants in the service at the beginning of the year was 197. During the period of this report 18 were appointed, 6 were discharged, 3 were retired, 1 died, and 1 deserted, leaving 204 in the service at the end of the year.

CLAIMS.

Below is shown the number of claims on hand, received, and disposed of during the fiscal year ending June 30, 1903:

	Claims for commutation of rations—		Total.
	While held as prisoner of war in rebel States.	While on furlough, and miscellaneous claims.	
There were on hand June 30, 1902.....	7	10	17
Received during the fiscal year.....	183	248	431
Total.....	190	258	448
Disposed of during the year.....	190	258	448
On hand June 30, 1903.....	0	0	0

The number of letters and indorsements written during the year in connection with the above claims was 834.

ACCOUNTS AND RETURNS.

The following is a statement of accounts current and returns of subsistence stores and property on hand June 30, 1902, received and examined during the fiscal year ended June 30, 1903, and on hand at the close of that fiscal year awaiting examination:

	Accounts current.	Returns of stores.	Returns of property.	Total.
On hand June 30, 1902.....	673	781	409	1,863
Received during fiscal year 1903.....	4,805	3,540	1,574	9,919
Total.....	5,478	4,321	1,983	11,782
Examined during fiscal year.....	5,328	4,116	1,876	11,320
On hand June 30, 1903.....	150	205	107	462

The examination of the accounts required the verification of 111,468 vouchers; the returns of stores, 78,289 vouchers, and the returns of property, 5,365 vouchers. In connection with the examination 7,360 postal cards were used, 8,341 letters and 6,695 indorsements written and recorded, 4,060 papers copied, and 403 days of time on unclassified work consumed.

CONTRACTS.

Contracts for subsistence supplies, including meals for recruits and recruiting parties to the number of 696, were acted on and disposed of during the fiscal year.

CERTIFICATES OF SERVICE AND NONINDEBTEDNESS.

Certificates of service as acting commissary were issued to the number of 705 and certificates of nonindebtedness to the number of 829.

CLERICAL FORCE, OFFICE OF THE COMMISSARY-GENERAL.

The clerical force of this Office is efficient and deserving. It is taxed to the limit of its capacity, and there are quite a number of clerks who work habitually and voluntarily before and after office hours to keep the work of their desks current. The practice of working overtime and the continual labor under pressure are not good for the work or the worker, and it is a hardship upon those who thus cheerfully strive to do work which a larger force is necessary to carry on. Notwithstanding continual effort to introduce new methods to reduce the work, the volume continues heavy and must naturally increase as time goes on.

Last spring the very limit of reduction in the force consistent with the public interest was effected. Since then administrative scrutiny and action have been imposed on this Bureau in connection with the accounts of militia officers, under the act of January 21, 1903, and also the work incident to the settlement of disbursing officers' accounts, under the act of March 3, 1903. A comparison of the present force now with what it was just preceding the war with Spain shows that early in 1898 there were 36 employees in this Office, at an annual compensation of \$42,760. The Army then was hardly 25,000. It was confined to a compact territory with no dependencies, and largely owing to territorial conditions existing then the work could be done to advantage. At present the size of the Army, the number of posts, and the work are, after repeated reductions, still nearly treble what they were during the earlier period; the territory involved now includes the United States, Porto Rico, Cuba, Alaska, Hawaii, Guam, Philippine Islands, and China, and the work can not be done to advantage.

To meet all these new developments and conditions only 32 employees in addition to the old force are allowed at present, at an annual compensation of \$33,520. There has been a steady reduction in the number of employees for over two years, and it is earnestly recommended that a slight increase be authorized, consisting of 1 clerk at \$1,800 for duty in charge of the accounting and examining branch—a most important and arduous position, requiring exceptional qualifications; 2 clerks at \$1,200 for duty in the same branch; 2 clerks at \$1,000 for duty as stenographers and typewriters (and satisfactory service can not be secured for less pay), and 1 messenger at \$840. An increase of \$250 in the

pay of the chief clerk is also urgently recommended. The labor and responsibility of the position fully justify and merit the slight increase, which would place the position more on an equality with other bureaus of the Executive Departments.

DEDICATORY EXERCISES OF THE LOUISIANA PURCHASE EXPOSITION.

During the time between April 27 and May 3, 1903, the Subsistence Department subsisted 3,000 officers and men at St. Louis, Mo., who were in attendance at the dedicatory exercises of the Louisiana Purchase Exposition. All arrangements were under the supervision of Lieut. Col. A. L. Smith, deputy commissary-general, who was assisted by Maj. W. H. Bean, commissary, Capt. T. B. Hacker, commissary, and Capt. W. Elliott, commissary. The whole affair was admirably conducted and successful throughout. The food and service were reported as excellent, and the experience acquired by the officers of the department is certainly valuable and will be of assistance on future occasions of this kind.

AUTUMN MANEUVERS AT FORT RILEY, KANS.

In accordance with the instructions of the Adjutant-General of the Army, dated August 16, 1902, to furnish the name of the commissary officer to be detailed on the staff of Maj. Gen. John C. Bates, U. S. Army, for the autumn maneuvers at Fort Riley, Kans., I submitted the name of Capt. H. J. Gallagher, commissary.

In his report of the Fort Riley maneuvers in October, 1902, General Bates stated:

The chief quartermaster, Capt. C. B. Baker, the chief commissary, Capt. Hugh J. Gallagher, the chief surgeon, Lieut. Col. John Van R. Hoff, and the chief signal officer, Maj. George P. Scriven, were on the ground for some days before the beginning of the encampment and made all necessary preliminary arrangements pertaining to their respective departments in a most satisfactory manner. * * *

Incoming organizations were met by a representative of the chief quartermaster and conducted to the camp site assigned, and the commanding officer furnished with a memorandum informing him as to all preparations made and as to the point from which and the manner whereby all supplies required could be obtained, both from the Quartermaster and Commissary departments. As I have said above, the manner in which these departments were conducted under Captain Baker and Captain Gallagher were very satisfactory. * * *

The work in the subsistence department was well thought out, the necessary supplies reaching the troops promptly, and they were generally satisfactory.

In order to accommodate the national-guard officers who attended without troops a wall tent was assigned to each, and the chief commissary procured and had erected a large mess tent capable of seating about 200 persons. With my staff I procured my meals at the same mess, and am pleased to say it was satisfactory. This mess, although under the control of a commissary officer, was in the immediate charge of a hired caterer, who did very well, but I concur in the opinion expressed in a report submitted upon the termination of the camp by the chief commissary, that hereafter the subsistence department conduct the mess for officers and visitors at headquarters without the intervention of a caterer, the quartermaster department supplying the necessary ranges, cooking utensils, and tableware, leaving to the former department to hire the steward, cooks, waiters, and supply the food. In view of the fact that even a larger number of national-guard officers will probably hereafter attend the maneuvers, if the War Department decides to hold them, the chief commissary is further of the opinion that to get the best results when an appropriation is made by Congress providing for these encampments, one item should cover the employment of cooks, stewards, and waiters. In this way officers and visitors living at headquarters can be supplied with wholesome food at reasonable rates; in fact, at the actual cost of food itself, increased by the cost of perhaps a few other minor necessities and paying for breakages and loss of tableware.

Capt. H. J. Gallagher, commissary, chief commissary of the maneuver division, at Fort Riley, Kans., in his report of October 8, 1902, to the adjutant-general of the maneuver division, concerning the operations of the subsistence department, says:

* * * The matter was simplified very much by the proximity of Fort Riley and the establishment of the commissary depot in the post under the charge of the post commissary officer. Warehouses and all necessary to properly care for and issue stores were in this way rendered easily available. The rations were drawn from the nearest purchasing stations or brought with them by the troops. They proved to be of excellent quality throughout, and no word of complaint was heard of a serious nature. Fresh meat was furnished from a refrigerator car situated convenient to all the organizations in camp. Fresh bread was issued daily from the post bakery. On one occasion complaint was made as to the quality of the bread, but upon investigation, I found this was due to poor yeast. This was promptly remedied and no further complaints were received. This, I think, is the only complaint I received in camp regarding the rations. The beef contractor gave some trouble by endeavoring to supply meat below that required by contract. In this endeavor he did not succeed.

The messing of officers, a great many of whom came in from different States throughout the Union, proved a new venture, and in this connection I would like to submit the following recommendations, notwithstanding the fact that the mess as conducted by a caterer proved to be quite successful. If these camps are to be a permanent affair, there will always be a large number of visitors at headquarters, especially so if the National Guard are to take as prominent a part in the maneuvers as is anticipated.

I would recommend that the commissary department conduct the mess for officers and visitors without the intervention of a caterer, the quartermaster's department supplying ranges, cooking utensils, and all tableware, the commissary department to supply steward, cooks, waiters, and table linen, as well as the food. To get the best results, when appropriation is made by Congress providing for these encampments, one item should cover the employment of stewards, cooks, and waiters. In this way officers and visitors living at headquarters could be supplied with good, wholesome food at a reasonable rate; in fact, at the actual cost of the food itself, increased by the cost of laundering linen and paying for breakage of china and loss of tableware. The transport system of furnishing food is similar to this, so that this would scarcely be an innovation, excepting that in the transport system all the expenses of preparing and serving food is charged to the consumer.

Captain Cole rendered very valuable services in connection with the mess at division headquarters, and in other ways his services proved of great assistance to me. Lieut. John J. Boniface, post commissary, Fort Riley, Kans., performed the duties of depot commissary very satisfactorily. He is a keen and energetic young officer, and took active interest in his work. He was provided with commissary-sergeants and civilian laborers necessary to properly conduct his work.

The Regular Army ration was supplied the organizations of the National Guard from Kansas and Colorado, for which they paid at cost price. It seemed to have proven very satisfactory. One evening was devoted to instruction of officers of the National Guard regarding the workings of the commissary department. The instruction was given by Captain Cole in a very thorough manner. It was my intention to give practical instruction in rendering accounts and returns, but bad weather interfered to prevent it. I would suggest that this be made an important feature of all future encampments, as from my experience in the field and in the office of the Commissary-General I know that officers of the National Guard are woefully ignorant of our system of accountability for stores and money.

I am very much indebted to Major Bean, chief commissary of the department, for his prompt work in getting the supplies requested to Fort Riley.

In a supplemental report to the same officer, under date of October 22, 1902, Captain Gallagher states:

* * * In order to properly facilitate the work of the department in the handling of stores and issue of rations, it was necessary to employ civilian laborers between the dates of September 12, 1902, and October 12, 1902, the number so employed during the various portions of this period being 10, the rate of payment being \$40 per month and a ration each, the total expenditure reported being \$314.62, which amount covers the entire additional cost to the department in excess of the normal expenses for the support of the troops and ordinary practice marches.

SETTLEMENT OF ACCOUNTS OF DISBURSING OFFICERS.

In the act of March 3, 1903, Congress provided for the settlement of certain accounts of disbursing officers of the War Department arising between April 21, 1898, and July 8, 1901.

The provisions embodied in the act are as follows:

That the proper accounting officers of the Treasury be, and they are hereby, directed, in the settlement of the accounts of disbursing officers of the War Department arising between the twenty-first day of April, eighteen hundred and ninety-eight, from which date war with Spain is declared to have existed, and the eighth day of July, nineteen hundred and one, inclusive, the date on which the last organization of the Volunteer Army was mustered out of the service of the United States, to allow such credits for payments and for losses of funds, vouchers, and property as may be recommended under authority of the Secretary of War by the heads of the military bureaus to which such accounts respectively pertain.

That the accounts of military officers, whether of the line or staff, for Government property charged to them, shall be closed by the proper accounting officers whenever, in the judgment of the Secretary of War, it will be for the interest of the United States to do so: *Provided*, That such accounts originated subsequent to April twenty-first, eighteen hundred and ninety-eight, and prior to the ninth day of July, nineteen hundred and one: *Provided further*, That no settlement shall be made by the officers of the Treasury, under this act, of the accounts of any officer whose combined responsibility for public money and Government property shall exceed the sum of five thousand dollars, and only of such officers of the Army in whose accounts there is no apparent fraud against the United States: *And provided further*, That this act shall remain in force for two years from and after its passage, and no longer.

There are unsettled accounts of several hundred officers who performed duty in the Subsistence Department which fall within the period named above, and which are affected by the law.

The accounts are being acted upon in this office as expeditiously as circumstances will admit.

THE MILITIA.

The act of January 21, 1903, embodies an extensive scheme of legislation to promote the efficiency of the militia. The act repealed the militia law as contained in sections 1625 to 1661 of the Revised Statutes, with the single exception of the last-named section. That section, with its various modifications and amendments, continues in force and constitutes one of the vital features of the present militia law.

Before amendment section 1661 read:

The annual sum of two hundred thousand dollars is appropriated, to be paid out of any money in the Treasury not otherwise appropriated, for the purpose of providing arms and equipment for the whole body of the militia, either by purchase or manufacture, by and on account of the United States.

This section was amended and its provisions enlarged by the act of February 12, 1887, and the amount of the annual appropriation was increased to \$400,000. The section was again amended by the act of August 18, 1894, wherein it is provided that the appropriation is not to lapse with the end of any fiscal year, nor to be turned into the surplus fund, but to remain a permanent appropriation and to be available until expended, as provided by the acts, or otherwise disposed of by Congress. The section was still further amended by act of June 6, 1900, which increased the annual appropriation to \$1,000,000. By the act of January 21, 1903, the scope of the section in question was materially enlarged, but the annual appropriation remained at \$1,000,000.

Until the passage of the last-named act the Subsistence Department was not affected by any section of the statute embodying the militia law so far as subsistence is concerned, except by sections 1650 and 1655 of the Revised Statutes, and it was not affected by any amendments to section 1661 of the Revised Statutes, as contained in the acts of February 12, August 18, and June 6, above mentioned, which only applied to the Quartermaster's and Ordnance departments; but with and from the passage of the act of January 21, 1903, section 1661 was modified and the law so extended that the Subsistence Department was also included in the scheme of legislation to promote the efficiency of the militia.

It may be noted in this connection that the act of March 1, 1889, which provides, among other features, for the subsistence of the militia of the District of Columbia, and the act of May 11, 1898, which provides for the subsistence of the Naval Militia of the District of Columbia, are special acts and apply exclusively to those bodies of militia, and do not, it is assumed, affect the general militia law so far as subsistence is concerned. This is the view of the Judge-Advocate-General of the Army (as expressed in his opinions of July 3 and August 21, 1903). The act of February 24, 1897, affected the Subsistence Department to the extent that the militia of the States and Territories were permitted to purchase subsistence supplies for cash. This act was amended by the act of March 15, 1898, which provides that the cost of all stores and supplies sold to the States and Territories is to be credited to the appropriation from which they were procured and remain available to procure like stores and supplies for the Army in lieu of those sold as aforesaid. These two acts were modified by the last part of section 17 of the act of January 21, 1903, which also required the cost of transportation to be added to all purchases of Government supplies by the militia. The act of March 2, 1903, appropriating \$2,000,000 for arming and equipping the militia affected the Subsistence Department in so far that, if necessary to the proper equipment of the militia of the States and Territories, certain subsistence property (such as commissary chests, field desks, etc.) can be supplied to the militia under that act.

The only sections of the act of January 21, 1903, which specifically relate to the Subsistence Department are sections 14, 15, and 17, and, perhaps in an incidental way, sections 16 and 21.

Section 14 is as follows:

That whenever it shall appear by the report of inspections, which it shall be the duty of the Secretary of War to cause to be made at least once in each year by officers detailed by him for that purpose, that the organized militia of a State or Territory or of the District of Columbia is sufficiently armed, uniformed, and equipped for active duty in the field, the Secretary of War is authorized, on the requisition of the governor of such State or Territory, to pay to the quartermaster-general thereof, or to such other officer of the militia of said State as the said governor may designate and appoint for the purpose, so much of its allotment out of the said annual appropriation under section sixteen hundred and sixty-one of the Revised Statutes as amended as shall be necessary for the payment, subsistence, and transportation of such portion of said organized militia as shall engage in active field or camp service for instruction, and the officers and enlisted men of such militia while so engaged shall be entitled to the same pay, subsistence, and transportation or travel allowances as officers and enlisted men of corresponding grades of the Regular Army are or may hereafter be entitled by law, and the officer so designated and appointed shall be regarded as a disbursing officer of the United States, and shall render his accounts through the War Department to the proper accounting officers of the Treasury for settlement, and

he shall be required to give good and sufficient bonds to the United States, in such sums as the Secretary of War may direct, faithfully, to account for the safekeeping and payment of the public moneys so entrusted to him for disbursement.

Section 15 reads:

That the Secretary of War is hereby authorized to provide for participation by any part of the organized militia of any State or Territory on the request of the governor thereof in the encampment, maneuvers, and field instruction of any part of the Regular Army at or near any military post or camp or lake or seacoast defenses of the United States. In such case the organized militia so participating shall receive the same pay, subsistence, and transportation as is provided by law for the officers and men of the Regular Army, to be paid out of the appropriation for the pay, subsistence, and transportation of the Army: *Provided*, That the command of such military post or camp and of the officers and troops of the United States there stationed shall remain with the regular commander of the post without regard to the rank of the commanding or other officers of the militia temporarily so encamped within its limits or in its vicinity.

Section 17 states:

That the annual appropriation made by section sixteen hundred and sixty-one, Revised Statutes, as amended, shall be available for the purpose of providing for issue to the organized militia any stores and supplies or publications which are supplied to the Army by any Department. Any State, Territory, or the District of Columbia may, with the approval of the Secretary of War, purchase for cash from the War Department, for the use of its militia, stores, supplies, material of war, or military publications, such as are furnished to the Army, in addition to those issued under the provisions of this act, at the price at which they are listed for issue to the Army, with the cost of transportation added, and funds received from such sales shall be credited to the appropriations to which they belong and shall not be covered into the Treasury, but shall be available until expended to replace therewith the supplies sold to the States and Territories and to the District of Columbia in the manner herein provided.

One of the objects in bringing the militia into the maneuver camps is to acquaint them not only with field and camp instruction, but also to impart a knowledge of the work of administration, a feature of which is the subsistence of the troops, which involves the receipt of funds, stores and property, and the proper disposition and accounting therefor.

It is thought that the work of the encampments should be conducted as far as practicable in conformity with the requirements of the Regular Army, so that in time of war, when the militia become a part of the United States forces, they will have a practical knowledge of papers, business methods, and requirements of the War Department, and will not have to make a study of such matters in the midst of a campaign, when inevitable confusion would result. A systematic method is very essential and will greatly facilitate the work in the Commissary-General's office.

In the system of accountability prescribed the aim has been to have as few blank forms as possible. Those authorized are prepared on light blue-tinted paper with a crescent design, having thereon the words "Militia. State of ———," printed on each form, so as to have a distinctive mark for the militia blanks and a space to enter the particular State.

The following is a list of the authorized blank forms:

1. Account current.
2. ————.
3. Abstract of disbursements to accompany account current.
4. Voucher for supplies purchased on sealed proposals and acceptances.
5. Voucher for supplies purchased under written contract or open-market purchase.
6. Report of emergency purchases exceeding \$200.

7. Receipt roll for commutation of rations and liquid coffee money.
8. Receipt roll for liquid coffee.
9. Receipt roll for savings purchased.
10. Voucher for services.
11. Abstract of proposals.
12. Return of subsistence stores.
13. Abstract of purchases of subsistence stores.
14. Combined invoice of and receipt for stores and property.
15. Statement of gains and wastage.
16. Abstract of issues.
17. Accounts of sales at auction.
18. Return of subsistence property.
19. Requisition for stores for issue.
20. Requisition for subsistence property.
21. Ration returns.
22. Requisition for blanks.
23. Consolidated ration return.
24. Issue slip.
25. Return of patients in hospital.
26. Statement to accompany proceedings of boards of survey.

ICE.

Until the passage of the act of March 2, 1903, provision was made in the annual appropriations for the Subsistence Department for the issue of ice to organizations of enlisted men stationed in island possessions only. Now, under the law, ice can be issued to organizations of enlisted men at such places as the Secretary of War may determine; and General Orders 111, Adjutant-General's Office, 1903, embody regulations concerning its issue under the following conditions:

Where ice can be furnished to organizations of enlisted men of the Army it may be issued by the Subsistence Department, where rations are issued in kind at not more than 2 pounds for each ration, subject to the following conditions:

The maximum allowance to any organization or detachment to be 100 pounds per day. No allowance of ice will be made to troops stationed north of the forty-third parallel of north latitude, except as provided below. To troops stationed between the thirty-seventh and forty-third parallels of north latitude and in the States of Washington, Oregon, and Idaho the allowance will be for six months only, beginning the 16th of April and ending the 15th of October. To troops stationed south of the thirty-seventh parallel of north latitude the allowance will be for the whole year. No savings or wastage will be allowed on ice. Allowance of ice will not be subject to commutation.

STORES REPLACED BY SELLERS.

Owing to reductions in garrisons in the Philippines, and through other causes, large quantities of stores accumulated in excess of the wants of the Army, and for which there was no satisfactory sale in the islands. To meet these conditions and probable losses it was deemed a provident plan to return many of the stores to the United States for issue in part at least, and where a probable market might be found for the sale of others. It was hoped by this disposition to save large losses to the Government.

Among the articles so returned were considerable quantities of baking powder, malted milk, and tobacco. These stores, which were but slightly deteriorated, were voluntarily replaced with fresh goods by the manufacturers and sellers to protect their brands and trade in the commercial world, although there was not the slightest moral obligation resting upon them to make the exchange. This incident shows the importance and advantage to the Government of dealing with responsible and reliable firms.

SUBSISTENCE FUNDS HELD IN HAND FOR READY DISBURSEMENT.

I again urgently recommend the passage of a bill by Congress to give authority to all officers intrusted with the disbursement of subsistence funds to hold restricted amounts of such funds in their personal possession. The exigencies of the public service require an open disregard of the restrictions of the existing law in cities where the treasurer or an assistant treasurer is located.

A bill which was intended to meet the necessities of the case passed the Senate March 24, 1900 (S. 2870), a copy of which is appended:

AN ACT Concerning disbursing officers of the Subsistence Department of the Army.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That officers intrusted with the disbursement of funds for the subsistence of the Army are hereby authorized to keep, at their own risk, in their personal possession for disbursement, such restricted amounts of subsistence funds for facilitating payments of small amounts to public creditors as shall from time to time be authorized by the Secretary of War.

AUTHORITY FOR DISPOSITION OF SUBSISTENCE STORES NO LONGER NEEDED.

In the last annual report of this Office the following was submitted for the consideration of the honorable the Secretary of War:

I have the honor to again urge upon the Secretary of War the need of legislation authorizing the sale at public auction of subsistence stores in good condition which may at any time accumulate in excess at any depot or point of supply, and which can not advantageously or economically be transported to other points for issue or sale to troops. The draft of a bill to accomplish the object desired heretofore submitted by this Office is, as follows:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of War may cause to be sold at public sale, under regulations to be prescribed by him, such subsistence stores in good condition, intended for issue or for sales to officers and enlisted men, as may from time to time accumulate at any subsistence depot, military post, or in the field, in excess of amounts required for use and which can not, with economy and advantage, be shipped to other subsistence depots, posts, or places for military use, the proceeds to be immediately available for general disbursement, under the appropriation for subsistence of the Army current at the time of sale for any of the objects contemplated by that appropriation."

As the proceeds of all sales of subsistence supplies are, by the act of March 3, 1875 (18 Stat. L., 410), now "exempt from being covered into the Treasury" and are made "immediately available for the purchase of fresh supplies," the above proposed legislation is in exact accord with existing law as to disposition of proceeds of authorized sales of subsistence supplies. There is no law, however, authorizing the sale to the public of subsistence supplies in bulk which are in good condition, the only legislation bearing on the subject of sales of military supplies (sec. 1236, Rev. Stat.) being general in its nature and providing only for the sale of stores which, upon proper inspection or survey, appear to be "damaged" or "unsuitable for the public service." As all public sales of subsistence supplies in good condition in bulk now taking place are being made under the guise of the stores being "unsuitable," and such an appropriation of the wording of section 1236 to cover transactions which would else be without even the color of authority of law is strained and unsatisfactory, I earnestly recommend that the above draft of law be pressed upon the attention of Congress.

As illustrating the wastefulness which is consequent upon the absence of a law authorizing the public sale of subsistence stores in good condition which in the vicissitudes of service have been left as surplus at distribution points in spite of all reasonable foresight, it may be stated that in order to avoid total loss to the Government valuable stores which had been purchased for sales to officers and enlisted men under section 1144, Revised Statutes, have been issued to enlisted men in place of equal weights of the authorized articles of the ration. A law authorizing the public sale of such stores would have served the necessity of resorting to such extravagant issues in

order to avoid a total loss. The same conditions exist in all sections where rapid removals of troops take place or where throughout extensive regions troops are withdrawn or discharged.

DIVISION OF THE PHILIPPINES.

I. GENERAL REMARKS.

A number of questions perplexed and gave concern to the Subsistence Department during the year. They were a legacy from previous years and cover the entire period of American occupation in the islands. The most difficult and vital to deal with have at all times been those which relate to the supply of fresh meat, fresh vegetables, ice, and other perishable stores, the supply of which is so essential to the health, comfort, and contentment of the troops.

The solution of the transportation problem, upon which so many others hung, greatly aided toward a successful outcome. The reduction of the military forces of the islands, and consequent reduction of posts, removal of troops from interior places, and concentration at points on the seacoast and along the railroad, thus permitting refrigerator and meat boats and commercial liners to make regular routes and schedules, all made toward a successful solution of the various problems.

Subsistence affairs are now on a settled and satisfactory basis, and much of the credit for this fortunate state of affairs is due to the untiring efforts and administrative talent of Col. Henry G. Sharpe, the chief commissary of the Division of the Philippines.

II. SOURCES OF SUPPLY.

San Francisco supplied the largest portion of the articles of the ration and many sales-stores. Chicago furnished the bulk of the salt meat and meat products, while Kansas City and Omaha were also drawn upon for packing-house products. St. Louis furnished a few articles which that market could most economically supply. New York furnished the greater portion of the articles for sales to officers and enlisted men. The policy of the Subsistence Department is to purchase in the most advantageous market, considering cost and quality and the interests of the Government, and always favors the home or local market, everything being equal. In pursuance of this policy the following articles were purchased at Manila: Fresh beef, fresh mutton, rice, potatoes, onions, teas, issue sugar, ice, matches, butter, cheese, cigars, clothes lines, ginger ale, Australian milk, Pear's toilet soap, table salt, cut-loaf sugar, granulated sugar, powdered sugar, Tansan water, toilet water, stewards' stores for transports, and exceptional articles.

III. FRESH MEATS.

This is the most essential and sought after article of the soldier's diet, and has, almost without exception, been supplied in abundance throughout the islands. The chief commissary of the Division of the Philippines says:

During the past fiscal year, through the services of the Navy Department, the fresh-beef supply of this division was purchased in Australia and brought to this city by means of the navy supply vessels. The quality of the beef has been uniformly good. Until the last cargo the beef furnished was all in hind quarters, but

on account of the drought in Australia and the large demand made on the market as a consequence of the operations in south Africa the price of beef was considerably advanced, and it was found advantageous to purchase both fore and hind quarter meat. In accordance with instructions from the Commissary-General this office advertised, in September, 1902, for proposals for supplying fresh beef in Manila from sling at ship's side, and in consequence of the existence of the same conditions in Australia the advertisement called for fore and hind quarter meat. A satisfactory price was obtained and contract entered into for the beef supply for the fiscal year 1904. The beef will be brought from the Argentine Republic.

On the subject of fresh beef the chief commissary of the Department of Mindanao remarks:

It is incontrovertible that troops serving in these islands desire a full supply of frozen or refrigerated beef, and their prejudice against native beef, or beef cattle obtained from any source, is so marked that they often prefer the canned meats. My experience during the past year but confirms earlier convictions that the only practical, economical, and satisfactory method of supplying troops with the fresh-meat component of the ration in these islands is by bringing to Manila frozen or refrigerated beef and issuing it from local and central cold-storage plants. * * *

The chief commissary of the Department of the Visayas in dealing with the question states:

Due to the impossibility of obtaining native beef, save in limited quantity at exorbitant price (16 to 25 cents gold per pound), and the vastly superior quality of the Australian frozen beef, the department from the first began to depend wholly for its supply on Manila. The introduction in the fall of 1902 of the refrigerator steamers *Seward* and *Wright* was a long step toward the final solution of the problem, which will be as nearly as possible perfect when the ice plants with cold-storage rooms now under construction at important points are completed. Until then dependence must be placed on ice boxes, which, even with liberal supply of ice, not always obtainable, are efficacious only for a limited time. As small stations are gradually abandoned and troops concentrated, the steamers referred to make more frequent visits and comparatively few complaints of scarcity are now heard.

These steamers leave Manila alternately and at somewhat irregular intervals, each making two trips per month and touching at least once on each trip at each post with very few exceptions, these being reached by ordinary transport or commercial liner carrying large ice boxes in which the frozen beef is packed and usually reaches its destination in excellent condition. So that while the supply at some posts is somewhat irregular, all are reached at less or greater intervals and complaints are rare and losses comparatively infrequent. The records of this office show that of 634,305 pounds of frozen beef and mutton shipped from Manila to posts in this department since its establishment October 1, 1902, the total losses reported by boards of survey amount to 19,635 pounds. Five thousand and forty-seven pounds of this amount were lost on a chartered transport held in quarantine through a case of cholera on board, and the health authorities refusing to permit the removal of the beef until end of the quarantine period, when the ice in the chests had melted and the beef was thrown overboard. Other losses were due principally to inability to obtain sufficient ice for its preservation after delivery at posts, and one cargo of 1,289 pounds en route Iloilo to Camp Jossman, across the bay, on a flat-bottomed scow, which was capsized by a high sea and the beef sent to the bottom of the bay and hopelessly lost.

Beef is delivered by the refrigerator steamers, frozen solid, and its quality is unvaryingly excellent and satisfactory, no criticism or complaint in this direction having reached this office. A personal experience of nearly two years, during which I have eaten it perhaps daily—when I could get it—finds my appetite and appreciation quite as keen as on my first experience, or as ever at the best hotel or restaurant or private table in the United States.

As far as known the experience of officers and men agrees with my own, many expressions to this effect and nothing to the contrary having been heard.

The beef has ranged in price from 6.8435 to 8.1108344 cents per pound. Its comparative cheapness, facility of handling and transportation, immunity from loss or waste under ordinary circumstances, uniformly excellent quality, and vast superiority over any native beef obtainable together appear to leave little to be desired in this important and highly appreciated component of the ration.

IV. FRESH VEGETABLES.

Great quantities of fresh vegetables, consisting of potatoes and onions, have been supplied at reasonable prices but with considerable losses. Up to the present it has been necessary to transport vegetables from the United States or regions outside of the islands; but in the course of time, as the Agricultural Department and the adjutant-general of the division have already demonstrated by successful experiments, gardens can be cultivated with satisfactory results. When vegetables can be raised in sufficient quantities they can readily find a home market. The prices of the vegetables supplied under contract were 2.6 cents per pound for both potatoes and onions. Desiccated vegetables are unpalatable, disliked, and do not meet requirements.

I quote from the report of the chief commissary of the Division of the Philippines:

With the exception of one or two months during the recent warm weather, the fresh-vegetable contract has been satisfactory. During the very warm weather, owing to the fact that the potatoes were old, considerable losses have resulted. Contracts for fresh vegetables have been made for the succeeding year at slightly reduced prices to those prevailing at present.

The chief commissary of the Department of Mindanao, in speaking of the fresh-vegetable supply, says:

Until my arrival here all stations in the department except those on the north coast, were supplied with Java potatoes and onions. I stopped the supply, as they were very small and unsatisfactory in every way and there was much loss from deterioration. The potatoes and onions shipped from the depot at Manila have been very satisfactory until the last two months, during which time the losses on potatoes have been very heavy. This is due to the age of the potatoes at this season of the year, when it seems to be impossible to prevent rapid deterioration under the best of handling.

V. ICE.

The supply of ice has not in all cases been ample, while the price has been excessive. The high prices could not be avoided in the past and are hardly open to remedy now, for the reason that the cold-storage and ice plant at Manila which has the ice contract has practically no opposition in the islands. It is the only concern which can meet the demands of the department. The chief commissary of the division states:

There were purchased from the insular cold storage and ice plant 9,826,384 pounds of ice at a total cost of \$49,144.76, the ice being used for issue to troops and in the preservation of subsistence stores. This ice was purchased under contract with the insular government for the present fiscal year, contract price being one-half cent per pound.

VI. OVENS.

On the subject of ovens the chief commissary of the Division of the Philippines, says:

There are many posts in the division which have no baking facilities whatever. The majority of posts having such facilities are supplied with one or more Blodgett ovens, a most unsatisfactory oven. It is recommended that permanent ovens be placed in all of the posts.

VII. EXCESS OF STORES.

Large quantities of old stores have been on hand in the Philippines for a number of years, the result of military exigencies and an effort to

provide against contingencies that could not be foreseen. The chief commissary of the Division of the Philippines, in his last annual report, in treating of the subject, says:

At the beginning of the present fiscal year there was on hand at the depot, Manila, and at depots and stations throughout the division, subsistence stores largely in excess of the requirements of the command after the material reductions in same during the preceding year, the strength of the command in July, 1901, being 49,070, and in July, 1902, 29,406. It was apparent that this surplus could not at the rate of consumption under the changed conditions be exhausted in time to prevent loss to the Government through deterioration, and some action became necessary with a view toward disposing of a part of the excess by other means than regular issues and sales to the Army. In pursuance of this object the surplus stores were submitted for the action of an inspector, and in due course offered for sale under sealed proposals to be opened August 29, September 5, 12, and 19, 1902.

This effort to dispose of the surplus stores proved unsuccessful, as did also a second effort under advertisement dated September 6, and a third under advertisement dated December 28, which latter was published in Singapore and Hongkong newspapers as well as in the Manila papers. Following this a circular advertisement was published for a public auction from day to day, beginning April 8, 1903. At the auction surplus stores for which the Government received \$16,397.89 were sold.

At this writing but an insignificant portion of the old stock of surplus stores remains on hand. The progress made in the reduction of stock on hand during the fiscal year is shown by the following from the annual report of the depot commissary, Manila:

Gross weight of stores received from United States 20,956,006 pounds; gross weight of stores shipped 43,601,650 pounds, or a reduction during the fiscal year of 22,645,644 pounds gross stock on hand.

VIII. LOSSES OF SUBSISTENCE STORES.

The effect of climate, exposures of transportation, and the old age of many of the stores themselves, account for the largest portion of the losses reported; but with the greatly reduced quantities of these old stores now on hand losses will be at a minimum in the future.

The chief commissary of the division says on this subject:

The losses of subsistence stores in the Division of the Philippines by deterioration, shortage, etc., during the fiscal year are shown in the following statement:

Department of Luzon.....	\$118,154.50
Department of Visayas.....	79,225.11
Department of Mindanao.....	38,762.76
Depot commissary, Manila.....	103,512.32
Sales commissary, Manila.....	4,624.34
Total.....	344,279.03

Principal items of subsistence stores deteriorated, etc., in the Division of the Philippines during the fiscal year, total value of which is included in above statement.

	Department of Luzon.	Department of the Visayas.	Department of Mindanao.	Depot commissary, Manila.	Sales commissary, Manila.	Total.
Beef cattle.....	\$590.24		\$89.60			\$679.84
Meats, fresh.....	2,231.26	\$2,748.96	1,188.85	\$133.02	\$65.49	6,388.60
Meats, canned.....	4,150.30	3,188.14	1,416.82	88.76	68.55	8,913.07
Bacon, issue.....	7,606.30	18,291.71	2,654.14	4,269.78	32.68	27,854.61
Flour.....	3,423.66	2,082.29	1,113.08	445.63	10.71	7,075.37
Hard bread.....			1,846.18			1,846.18
Potatoes, fresh.....	6,506.62	5,854.22	8,549.85	8.29	12.90	15,981.88
Onions, fresh.....	733.81	1,062.23	279.30	21.79	3.88	2,100.51
Vegetables, canned.....	4,865.53	3,234.09	651.40	10,666.34	84.44	19,001.80
Fruits, canned.....	8,791.23	5,007.26	2,806.01	64,483.76	663.43	81,700.74

IX. ICE PLANTS, COLD-STORAGE FACILITIES, AND REFRIGERATOR BOATS.

In commenting upon these subjects the chief commissary of the Division of the Philippines remarks:

At the present time there are ice plants in operation at 14 posts in the division. Five posts are provided with cold-storage facilities, while many other posts have ice boxes holding from one to four days' supply of fresh beef and ice.

In October, 1902, regular schedules were arranged for the inter-island transports. Eight routes were established and provision made for regular sailings. The problem of supply since that time has been a comparatively easy one, due to the certainty of sailing of transports for designated ports at regular intervals. The problem of fresh-meat supply was, until late in the fall of 1902, a very difficult one to posts throughout the division, except those in the immediate vicinity of Manila or along the line of the Manila and Dagupan Railroad, due to the lack of cold-storage facilities at posts and the impossibility of shipping to the southern posts without the aid of refrigerator boats. The transport *Seward*, a refrigerator boat, arrived in this division in October, 1902, and immediately commenced the distribution of beef. Later on the *Wright* was repaired and arranged for a refrigerator boat, and these two boats have been assigned to definite routes, making two trips each per month.

As a result practically all posts in the division, except the post of Borongan, Samar, are now being supplied with frozen beef, many being fully supplied, and to others there is shipped as large a quantity of beef as can be cared for in the ordinary ice boxes available at posts. As soon as cold-storage facilities are installed at posts sufficient to care for a month's supply for the garrison, it is believed that one refrigerator boat will be able to keep all posts in the division touched at by the transports fully supplied with beef.

X. DEPOT AND SALES COMMISSARY.

The sales commissary was consolidated with the depot commissary in the latter part of June, which resulted in a large saving to the Government in the items of rent and services.

Since July 1, 1902, warehouses Nos. 2, 3, 4, and 5, pertaining to the depot commissary, have been abandoned, effecting a saving of rent to the Government of over \$43,000 a year and a reduction in expenses for services of about \$36,000. In this connection Maj. W. H. Baldwin, the depot commissary at Manila, states that:

Capt. James A. Logan, jr., who had exclusive charge of moving contents of all warehouses to the south side of the Pasig River, accomplished this transfer without losing a dollar's worth of stores. A fine piece of work, and is duly commended.

He also remarks in connection with the duties and labor of the depot:

Gross weight of stores received from the United States, 20,956,006 pounds. Gross weight of stores shipped, 43,601,650 pounds. During the fiscal year there were 6,766 invoices made for stores and 285 for property.

It is recommended that not more than a six months' supply of any article be kept in stock, and as small a quantity of these supplies as the exigencies of the service will permit be kept with the troops, who have not the best storage facilities always at hand. Losses will then be reduced to a minimum.

It is a pleasure to report that all assistants have shown a great interest in their respective duties and performed them in a very satisfactory manner.

Average cost of messes on board inter-island transports exclusive of wages, steward's department.

Name.	Saloon.	Ship's officers.	Petty officers.	Sailors and fire-men.	Troop.	Hospital.
Burnside.....	\$0. 916	\$0. 623	\$0. 346	\$0. 118	.....	.....
Custer.....	.525	.39	.268		\$0. 17	.....
Ingalls.....	1. 003	.757	.379	.255	.107	.....
Liscum.....	.863	.72	.189	.168	.185	\$0. 206
Sacramento.....	.60	.47	.20	.....	.21	.....
Seward.....	.754	.703	.184	.18	.....	.....
Wright.....	.98	.67	.243	.215	.165	.....

Concerning the sales depot, Capt. Douglas Settle, commissary, reports the following:

The depot is practically the grocery and butcher shop of the army, navy, and marine corps stationed in and within a radius of 15 miles of Manila, and also such civilian employees of the Army as are authorized to purchase commissary stores. It is difficult to determine the number of purchasers, owing to the numerous changes in garrisons, and the varying number of troops casually in the city; the records of the depot, however, show a monthly average of 260 ledger accounts and 3,451 cash sales, and it is estimated that the average number of monthly purchasers is approximately 4,500.

This depot also issues for the depot commissary at Manila fresh meats to approximately 5,000 persons, furnishes commissaries to 7 inter-island chartered transports, and provides the special diet for 11 hospitals.

During the year special authority to purchase supplies at cost was extended by the division commander to the German war ship *Hertha*, and under that authority stores to the value of \$853.33 were sold. * * *

The quality of the stores handled with few exceptions has been very good; and notwithstanding that some of these stores have been on hand for several years the losses due to climatic and other unavoidable causes has been 6½ per cent.

XI. POST AND REGIMENTAL COMMISSARY-SERGEANTS.

In connection with this subject, the chief commissary of the division remarks:

There are 73 post commissary-sergeants stationed on duty in the Division of the Philippines, as follows:

Stationed in Department of Luzon	33
Stationed in Department of the Visayas	9
Stationed in Department of Mindanao	18
Stationed at depot commissary, Manila	7
Stationed at sales commissary, Manila	1
Stationed on transports	3
Sick in United States	2
Total	73

There are only two posts in the division at present at which issues are made that are not provided with a post commissary-sergeant. The post commissary-sergeants as a rule have rendered excellent service throughout the division in the past year. One of them was court-martialed and discharged from the service for some irregularity. Each of the 15 regiments of infantry and cavalry on duty in the division is authorized under the law to be provided with a regimental commissary-sergeant. These regimental commissary-sergeants have in many cases performed the duty of their office at posts. In some other cases they have been detailed on other duties, necessitating the stationing in this division of more post commissary-sergeants than would otherwise be required. In view of the fact that the regimental commissary-sergeants are not selected as carefully as the post commissary-sergeants, and also the fact that under section 1142 of the Revised Statutes the Secretary of War is authorized to appoint as many post commissary-sergeants as the service may require, it is recommended that the grade of regimental commissary-sergeant be abolished, as it frequently results in having two men enlisted and paid for doing the work of one man.

XII. CIVILIANS.

The question of civilian employees is one deserving of consideration. The chief commissary of the division states:

The services rendered by the clerks have been entirely satisfactory. The temporary clerks now in the service have been on duty in this division for a considerable time and have rendered good service. They have been selected from a large number of men and many of them should be permanently retained in the service. Recommendations regarding the transfer of such to the classified civil service have been forwarded in compliance with instructions.

XIII. AUTHORIZED LIST OF SALES STORES.

Troops in the Philippine Islands are isolated and far removed from the markets and other resources of civilization, and are consequently wholly dependent upon the subsistence department for their food supply. To meet in a measure their wants a new and liberal list of sales stores was authorized by the Secretary of War last May, and was published in circular 4, office of the Commissary-General, May 5, 1903, and subsequently modified as to the item of ice.

The following is the list of articles:

I. COMPONENTS OF THE RATION.

Articles.	Varieties.	Unit of weight or measure.	Kinds or sizes of packages.
Beef	Fresh	Pound	
Mutton	do	do	
Bacon	Dry-salt cure	do	Crate, 100 pounds, net; $\frac{1}{2}$ -pound can, 48 to case; 9-pound can, 8 to case.
Beef:			
Corned	Canned	Can	2-pound can, 24 to case.
Roast	do	do	Do.
Hash:			
Corned beef	do	do	Do.
Fresh roast beef	do	do	1-ration can, 24 to case.
Beef and vegetable stew	do	do	1-ration can, 24 to case; 2-ration can, 12 to case.
Fish	Dried	Pound	40-pound can, 1 to case.
	Pickled	do	5-pound can, 12 to case.
	Canned	Can	1-pound can, 48 to case.
Flour, straight	Winter	Pound	100-pound double sack; 50-pound cotton sack; in paraffin bag, outside, 6-ounce duck; 50-pound can, hermetically sealed, 1 can to case.
Hard bread	About 3 inches square	do	25-pound can, hermetically sealed, 2 to case.
Corn meal	White	do	5-pound sealed can, 12 to case.
Baking powder	Cream tartar	do	$\frac{1}{2}$ -pound can, 24 to case.
Hops	Dried	do	$\frac{1}{2}$ -pound packages, in 10-pound can, 8 to case.
Yeast	Dried or compressed	do	5-ounce can, 16 to case.
Beans:			
Dried	White, medium	do	Double sack, 100 pounds net.
Baked	Canned	Can	1-pound can, 48 to case; 8-pound, 24 to case.
Pease, dried	Split, yellow	Pound	Double sack, 100 pounds net.
Rice	Choice, No. 1	do	Do.
Hominy	Fine	do	2-pound can, 24 to case.
Potatoes	Fresh	do	Crate, 100 pounds net.
	Desiccated	do	20-pound tin, 2 to case.
Onions	Fresh	do	Crate, 100 pounds net.
	Desiccated	do	20-pound tin, 2 to case.
Tomatoes	Canned	Can	24-pound can, 24 to case.
Prunes	Undipped, not smaller than seventies	Pound	5-pound tin, 12 to case.
Apples	Evaporated	do	Do.
Peaches	Evaporated, unpeeled	do	Do.
Jam	Blackberry	Can	2-pound can, 24 to case.
Coffee	Roasted and ground	Pound	25-pound can, hermetically sealed, 2 to case.
	Black, Oolong	do	1-pound can, 40 to case.
Tea	Black, E. B.	do	Do.
	Green, Y. H.	do	Do.
	Green, Japan	do	Do.
Sugar	Extra C.	do	Double sack, 100 pounds net.
Vinegar	Not less than 35 grains	Gallon	$\frac{1}{2}$ barrel, painted red.
Pickles	Cucumber, 1,200 to barrel of 32 gallons	do	10-gallon keg, painted green.
Salt	Fine grain	Pound	50-pound sack, in wooden case.
Pepper	Black	do	$\frac{1}{2}$ -pound can, 25 pounds in case.
Soap	Issue	do	1-pound bar, 60 pounds in box.

I. COMPONENTS OF THE RATION—Continued.

Articles.	Varieties.	Unit of weight or measure.	Kinds or sizes of packages.
Candles.....	Stearic acid, sizes.....	Pound.....	40 pounds to box.
Emergency ration.....	Army.....	Can.....	1-ration can, 50 to case.
Candles, lantern.....	Stearic acid, 2½ by 1½ inches.....	Pound.....	40 pounds to box.
Matches.....	Safety, sixties.....	Box.....	Gross package, 5 to case.
Paper, toilet.....	Flat.....	Package.....	1,000 sheets to package, 100 packages to box.
Salt.....	Rock.....	Pound.....	50-pound sack, in wooden case.

II. OTHER ARTICLES.

Apples.....	Canned.....	Can.....	2½-pound can, 24 to case.
Apple butter.....	.....	Crock.....	3-pound crock, 12 to case.
Apricots.....	Canned.....	Can.....	2½-pound can, 24 to case.
Asparagus.....	do.....	do.....	Do.
Bacon, breakfast dry-salt cure.....	Sliced, canned.....	do.....	1-pound can, 48 to case.
Basins, hand.....	Agate.....	Number.....	12-inch, 50 to box.
Beans, hand.....	Stringless.....	Can.....	2-pound can, 24 to case.
Beef.....	Chipped.....	do.....	1-pound can, 48 to case.
Extract.....	.....	Jar.....	4-ounce jar, 12 to case.
Blanco.....	Khaki.....	Box.....	8-ounce zinc box, 72 to case.
Bluing.....	White.....	do.....	Do.
Borax.....	Powdered.....	do.....	2-ounce box, 144 to case.
Brooms, whisk.....	do.....	Pound.....	1-pound package, 24 to case.
Brushes.....	Medium.....	Number.....	Medium size, 72 to case.
Blacking.....	Polisher.....	do.....	72 to case.
Hair.....	Medium.....	do.....	Medium size, 11 row, solid back, 150 to case.
Nail.....	Bristle, stiff.....	do.....	Wood back, cased as required.
Shaving.....	Medium size.....	do.....	Wood handle, set rubber cement.
Tooth.....	Assorted.....	do.....	5-row individual cartons.
Butter.....	Best creamery.....	Pound.....	1-pound can, 100 to case.
Buttons.....	Bone, L. & S.....	Number.....	.....
Collar.....	No hinge.....	do.....	Gold plated.
Cabbage.....	Canned.....	Can.....	2½-pound can, 24 to case.
Candy.....	3 varieties.....	Pound.....	Each piece wrapped in pure tin foil, packed in ¼ and 1 pound cans with screw tops, 24 to case, case strapped and crated.
Can openers.....	Plain.....	Number.....	.....
Chamois skins.....	2 to 2½ feet square.....	do.....	.....
Cheese.....	Full cream.....	Pound.....	No filler, about 10 pounds each, 4 to box.
Cherries.....	Edam.....	Number.....	.....
Chocolate.....	Canned.....	Can.....	2½-pound can, 24 to case.
Cigars.....	Plain.....	Pound.....	1-pound package, 12 to case.
Cinnamon.....	Vanilla.....	do.....	Do.
.....	Three sizes.....	Number.....	7½, 7½, 7½ boxes.
.....	Ground.....	Pound.....	1-pound can, 6 pounds to case.
Clotheslines.....	Cotton.....	Foot.....	50-foot hank.
Clothespins.....	Wooden.....	Number.....	5-gross box.
Cloves.....	Ground.....	Pound.....	1-pound can, 6 pounds to case.
Cocoa.....	Breakfast.....	do.....	1-pound tin, 6 pounds to case.
Coffee, roasted.....	Mocha and Java.....	do.....	5-pound can, 10 to case.
Combs.....	Fine, rubber.....	Number.....	.....
Pocket.....	Rubber.....	do.....	.....
Medium.....	do.....	do.....	.....
Corn, green.....	Canned.....	Can.....	2-pound can, 24 to case.
Crabs.....	do.....	do.....	Do.
.....	Ginger.....	Pound.....	1-pound sealed tin, 24 to case.
Crackers.....	Soda.....	do.....	Do.
.....	Water, thin.....	do.....	Do.
Currents.....	Dried.....	do.....	1-pound can, 48 to case.
Electro-silicon.....	.....	Box.....	3-ounce box, 144 to case.
Envelopes, letter.....	6-inch, good.....	Number.....	Box of 250.
Extract of clams.....	Canned.....	Can.....	1½ pint can, 24 to case.
Farina.....	do.....	do.....	1-pound sealed can, 24 to case.
Flavoring extract.....	Lemon.....	Bottle.....	2-ounce bottle, 24 to case.
Gelatin.....	Vanilla.....	do.....	Do.
.....	.....	Packet.....	2-ounce packet, 48 to case.

II. OTHER ARTICLES—Continued.

Articles.	Varieties.	Unit of weight or measure.	Kinds or sizes of packages.
Ginger ale	Imported	Bottle	Pint bottle, 120 to barrel.
Ginger	Ground	Pound	4-pound dredge can, 6 pounds to case.
Ham	Dry-salt cure	do	In tierces.
Deviled	Canned	Can	4-pound can, 24 to case.
Handkerchiefs, linen	Medium size and quality	Number	
Ink, black	Writing	Bottle	8-ounce bottle, 24 to case.
Ink	Indelible	do	4-ounce bottle, 12 to case.
Jam	Assorted	Can	2-pound can, 24 to case.
Jelly	Currant	do	Do.
Lard	Choiceest	do	5-pound can, sealed, 12 to case.
Listerine		Bottle	14-ounce bottle, 12 to case.
Lobster	Canned	Can	1-pound can, 48 to case.
Lye	Concentrated	do	Do.
Macaroni	Medium	Pound	1-pound package, 25 in sealed can, cased.
Metal polish	Paste	Tin	8-ounce tin, 144 to case.
	Powder	Box	8-ounce box, 144 to case.
Milk:			
Condensed	Sweetened	Can	1-pound can, 48 to case.
Evaporated	Unsweetened	do	Do.
Condensed	Australian	Gallon	4-gallon can, 20 to case.
Mushrooms	Canned	Can	4 can, 50 to case.
Mustard	French	Bottle	8-ounce bottle, 12 to case.
	Ground	Pound	4-pound can, 6 pounds to case.
Needles	Nos. 3 to 9	Paper	
Nutmegs, whole	Sixty-fives to seventies	Pound	
Oatmeal, rolled	Compressed	Tin	2-pound tin, 36 to case.
Oil	Olive	Bottle	Quart bottle, 12 to case.
Olives		do	Pint bottle, 24 to case.
Oysters	Canned	Can	2-pound can, 24 to case.
Paper, letter	Good	Quire	6-quire package.
Peaches	Canned, extra quality	Can	24-pound can, 24 to case.
Pears	do	do	Do.
Peas, green, American	Petit pois	do	2-pound can, 24 to case.
Pencils, lead, American	Black	Number	12 to carton.
Penholders	Rubber	do	
Pens, steel	Coarse, fine, stub	do	Gross boxes.
Pepper, red	Cayenne	Pound	2-ounce bottle.
Pickles, assorted	Chowchow, gherkins, mixed	Jar	Pint jars, 12 to case.
Pineapples	Canned, coreless, sliced	Can	2-pound can, 24 to case.
Pins	Pyramid	Pyramid	12 to carton.
Pipes, briar wood	Straight stem, "Bull Dog"	Number	
Plum pudding		Can	2-pound can, 12 to case.
Polish, shoe	Black and russet	Bottle or can	72 to case.
Potatoes, sweet		Can	8-pound can, 24 to case.
Preserves, assorted	Strawberry and raspberry	do	1-pound can, 24 to case.
Raisins, L. L	6-crown	Pound	2-pound sealed tin, 10 to case.
Razors		Number	Wrapped in oil paper and tin foil.
Razor strops	Reversible	do	In paper cartons.
Salt, table	Refined	Bottle	24-pound bottle, 12 to case.
Sardines		Box	4-box, 100 to case.
Sauce	Cranberry	Crock	8-pound crock, 12 to case.
	Tomato catsup	Bottle	Pint bottle, 24 to case.
	Worcestershire	do	4-pint bottle, 12 to case.
Sauerkraut		Gallon	10-gallon keg.
Sausage	Vienna	Can	2-pound can, 24 to case.
Shoe strings	Linen and porpoise, flat, tubular.	Pair	72 to bundle.
Shrimps	Canned	Can	1-pound can, 24 to case.
Sirup	Cane	Gallon	4-gallon can, hermetically sealed.
Soap:			
Laundry	White floating	Cake	100 to box.
Scouring	One variety	do	10-ounce cake, 72 to box.
Shaving	Barber's bar	do	6 cakes to bar, 60 bars to box.
Toilet	3 varieties	do	48 or 72 in box.
Soup	Beef, chicken, clam chowder, mock turtle.	Can	Quart can, 24 to case.
Spinach	Canned	do	24-pound can, 24 to case.
Squash	do	do	Do.
	Corn	Pound	1-pound sealed can, 40 to case.
Starch		do	Do.
	Cut loaf	do	4 barrel.
Sugar, white	Granulated	do	Double sack, 100 pounds.
	Powdered	do	30-pound paper-lined case.
Tablet, letter	Linen	Tablet	100 unruled sheets in tablet.

II. OTHER ARTICLES—Continued.

Articles.	Varieties.	Unit of weight or measure.	Kind or sizes of packages.
Talcum powder	Toilet	Tin	Small tin, 144 to case.
Tapoca	Granulated	Can	1-pound sealed can, 24 to case.
Thread:			
Cotton	Black, khaki, and white...	Spool	Nos. 36, 40, and 50.
Linen	Black and white	do	200-yard spool, Nos. 30, 35, and 40.
Silk	Black	do	100-yard spool, sizes A, B, C, and D.
Tobacco:			
Chewing	Plug	Pound	In 28-pound butt, 2 to case.
Smoking	Granulated, 1 variety	do	In 5-pound sealed tin, 25 pounds to case.
Toilet water		Bottle	Pint bottle, 12 to case.
Tongue, beef	Canned	Can	2-pound can, 24 to case.
Tooth powder	2 varieties	Box, bottle, tube.	
Towels, bath	Cotton, 24 by 42 inches	Number	12 to package.
Towels	Huckaback, 21 by 42 inches	do	Do.
Toweling	Unbleached, about 19 inches wide.	Yard	25-yard bolt.
Water, effervescent	1 variety	Bottle	Pint bottle.
Wheat, rolled		Tin	2-pound sealed tin, 24 to case.
Witch-hazel		Bottle	Pint bottle, 12 to case.

Roster of officers of the Subsistence Department and their duties on July 1, 1903.

Name and rank.	Duty and station.	Assigned to present station.
COMMISSARY-GENERAL.		
<i>With rank of brigadier-general.</i>		
John F. Weston	Commissary-General	Dec. 13, 1900
ASSISTANT COMMISSARIES-GENERAL.		
<i>With rank of colonel.</i>		
Charles A. Woodruff	Temporarily chief commissary Department of California, San Francisco, Cal.	Oct. 1, 1902
Henry G. Sharpe	Chief commissary Division of the Philippines, Manila, P. I.	Aug. 1, 1902
Frank E. Nye	Chief commissary Department of the Columbia, and purchasing commissary, Vancouver Barracks, Wash. In charge of matters connected with the subsistence department on the transports sailing from Portland or Puget Sound ports.	Aug. 19, 1901
	Under orders to be relieved from duty at Vancouver Barracks and to proceed to Chicago, Ill., for duty as chief commissary Department of the Lakes, per Special Orders, No. 141, Headquarters of the Army, June 17, 1903.	
DEPUTY COMMISSARIES-GENERAL.		
<i>With rank of lieutenant-colonel.</i>		
William L. Alexander	Assistant to the Commissary-General, Washington, D. C.	June 13, 1902
Henry B. Osgood	Chief commissary, Department of Luzon, Manila, P. I.	Oct. 1, 1902
Edward E. Dravo	Chief commissary, Department of the East, Governors Island, N. Y.	Oct. 17, 1900
Abiel L. Smith	Purchasing commissary, St. Louis, Mo.	Sept. 17, 1901
COMMISSARIES.		
<i>With rank of major.</i>		
James N. Allison	Chief commissary, Department of the Visayas, Iloilo, P. I.	Oct. 5, 1902
William H. Baldwin	Purchasing and depot commissary, Manila, P. I.	Feb. 25, 1903
David L. Brainerd	Purchasing commissary, New York, N. Y.	Sept. 1, 1900
George B. Davis	Chief commissary, Department of the Colorado, and purchasing commissary, Denver, Colo.	Nov. 1, 1902
	Under orders to be relieved from duty at Denver, Colo., and to proceed to Vancouver Barracks, Wash., for duty as chief commissary, Department of the Columbia, and purchasing commissary, Vancouver Barracks, Wash., per Special Orders, 141, Headquarters Army, June 17, 1903.	

Roster of officers of the Subsistence Department and their duties on July 1, 1903—Continued.

Name and rank.	Duty and station.	Assigned to present station.
COMMISSARIES—continued.		
<i>With rank of major—Cont'd.</i>		
Barrington K. West.....	Relieved from duty as assistant to the Commissary-General, Washington, D. C., and directed to proceed to Denver, Colo., for duty as chief commissary, Department of the Colorado, and purchasing commissary, Denver, Colo., per Special Orders, 141, Headquarters Army, June 17, 1903.	
Albert D. Niskern.....	Left Washington July 1, 1903. Chief commissary Department of the Lakes, Chicago, Ill.	Jan. 31, 1902
Frank F. Eastman.....	Purchasing commissary, Chicago, Ill.	June 5, 1903
Charles R. Krauthoff.....	Assistant to depot commissary, Manila, Philippine Islands. Purchasing commissary, and subsistence superintendent, Army transport service, San Francisco, Cal., per S. O., 127, Headquarters Army, June 1, 1903. Arrived at San Francisco, June 15, 1903.	Apr. 5, 1903
William H. Bean.....	Chief commissary Department of the Missouri, and purchasing commissary, Omaha, Nebr.	Aug. 31, 1902
<i>With rank of captain.</i>		
William H. Hart.....	Assistant to the chief commissary Division of the Philippines, Manila, P. I.	Mar. 10, 1903
Alexander M. Davis.....	Post commissary, Fort Riley, Kans.	May 1, 1903
<i>Douglas Settle, U. S. Infantry..</i>	Sales commissary, Manila, P. I. Under orders to be relieved in the Division of the Philippines, to take effect June 28, 1903, and to proceed to the United States, per Special Orders, 98, Headquarters Army, Apr. 27, 1903.	Oct. 1, 1901
Hugh J. Gallagher.....	On duty with the General Staff Corps, Washington, D. C.	May 10, 1903
George W. Ruthers.....	Chief commissary, Department of Mindanao, Zamboanga, P. I.	Nov. 17, 1902
Harry E. Wilkins.....	Assistant to the Commissary-General, Washington, D. C.	June 1, 1903
William L. Geary.....	Assistant to purchasing commissary, San Francisco, Cal.	May 27, 1901
Charles P. Stivers.....	Commissary of camps, Presidio of San Francisco, Cal.	Aug. 31, 1901
Henry G. Cole.....	Assistant to the Commissary-General, Washington, D. C.	May 16, 1903
Arthur M. Edwards.....	Assistant to purchasing commissary, New York, N. Y.	June 1, 1902
Jacob E. Bloom.....	Assistant to depot commissary, Manila, P. I.	Oct. 21, 1901
Frank H. Lawton.....	Purchasing commissary and temporarily acting quartermaster, New Orleans, La.	Mar. 12, 1903
Thomas W. Darrah, U. S. Infantry.	Assistant to chief commissary, Department of the East, Governors Island, N. Y.	July 1, 1902
Thomas Franklin.....	Chief commissary Department of Dakota, and purchasing commissary, St. Paul, Minn.	Nov. 8, 1901
Frank A. Cook.....	Treasurer United States Military Academy and quartermaster and commissary of cadets, West Point, N. Y.	Jan. 8, 1902
William R. Grove.....	Assistant to the chief commissary, Department of the Missouri, Omaha, Nebr.	May 20, 1903
Theodore B. Hacker.....	Purchasing commissary, Kansas City, Mo.	Sept. 1, 1902
Morton J. Henry.....	Acting quartermaster, Kansas City, Mo.	Sept. 9, 1902
Samuel B. Bootes.....	Assistant to purchasing commissary, Chicago, Ill.	Sept. 7, 1902
Frederic H. Pomroy.....	Purchasing commissary, Boston, Mass.	Mar. 14, 1902
David B. Case.....	Chief commissary Department of Texas and purchasing commissary, San Antonio, Tex.	Mar. 17, 1902
William Elliott.....	Temporarily post commissary, Fort Sam Houston, Tex.	May 1, 1903
James A. Logan, jr.....	Assistant to purchasing commissary, Chicago, Ill.	Jan. 10, 1903
Julius N. Kilian.....	Assistant to the purchasing commissary, New York, N. Y.	Mar. 24, 1902
Salmon F. Dutton.....	Post commissary, Fort Leavenworth, Kans., per Special Orders, 83, Headquarters Army, April 9, 1903, as amended by Special Orders, 120, Headquarters Army, May 22, 1903.	May 17, 1902
Michael S. Murray.....	Assistant to the depot commissary, Manila, P. I.	May 31, 1902
<i>Hamilton S. Hawkins, U. S. Cavalry.</i>	Depot commissary, Iloilo, P. I.	Oct. 5, 1902
	Assistant to chief commissary Department of the Visayas, Iloilo, P. I.	
	Under orders to return from Manila to the United States and report by telegraph to the Adjutant-General of the Army, per Special Orders, 105, Headquarters Army, May 5, 1903.	
	Post commissary, Fort Grant, Ariz.	May 1, 1903
	Assistant to the chief commissary Department of the Colorado, Denver, Colo.	Apr. 30, 1903

NOTE.—The names of officers detailed from the line under section 26, act of February 2, 1901, are printed in *italic*.

W. L. ALEXANDER,
Acting Commissary-General.

REPORT OF THE SURGEON-GENERAL.

WAR 1903—VOL 2—5

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REPORT OF THE SURGEON-GENERAL.

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, D. C., August 19, 1903.

SIR: I have the honor to report upon the Medical Department of the Army during the fiscal year ended June 30, 1903, beginning with a statement of finances.

FINANCIAL STATEMENT, 1903.*

Medical and hospital department, 1903.

Transferred from medical and hospital department, 1902, by act approved June 30, 1902.....		\$1,000,000.00
Sale to Ordnance Department, U. S. Army.....	\$1.25	
Sales to U. S. Navy.....	380.53	
Sales to civil government, Philippine Islands.....	5,857.20	
Sales to States and Territories for use of National Guard.....	492.50	
Other refundments during the year (including transfer settlements by Treasury Department to adjust appro- priations, \$24,518.87).....	24,871.23	
		31,602.71
Total to be accounted for.....		1,031,602.71

Disbursed during the year:

Expenses of medical supply depots.....	527.49	
Medical supplies.....	237,128.00	
Medical attendance and medicines.....	9,360.91	
Medical expenses of recruiting.....	24,755.91	
Pay of nurses.....	2,195.00	
Pay of other employees.....	125,286.45	
Washing of hospital linen.....	28,880.53	
Expressage.....	817.63	
Notary fees.....	32.50	
		428,984.42
Transferred by Treasury settlements to adjust appropriations.....		22.02

Balances on hand June 30, 1903:

In United States Treasury and in transit thereto....	\$422,178.85	
In hands of disbursing officers—		
New York City.....	145,592.42	
Washington, D. C.....	10,944.11	
St. Louis, Mo.....	13,259.18	
San Francisco, Cal.....	3,579.85	
Manila, P. I.....	8,559.83	
Iloilo, P. I.....	100.61	
Peking, China.....	81.42	
Nagasaki, Japan.....	300.00	
		604,596.27

Total accounted for..... 1,031,602.71

*The disbursements in this statement include settlements with public creditors made by the accounting officers of the Treasury and charged by them to these appropriations.

REPORT OF THE SURGEON-GENERAL.

Medical and hospital department, 1902.

Balances on hand July 1, 1902, act of March 2, 1901	\$1,511,888.49
Sales to civil government, Philippine Islands	\$96.84
Other refundments during the year (including transfer settlements by Treasury Department to adjust appropriations, \$22.02)	356.63
	<u>453.47</u>

Total to be accounted for 1,512,341.96

Disbursed during the year:

Expenses of medical supply depots	112.92
Medical supplies	45,959.54
Medical attendance and medicines	3,144.94
Medical expenses of recruiting	3,503.08
Pay of nurses	222.43
Pay of other employees	4,498.44
Washing of hospital linen	3,459.97
Expressage	32.05
Notary fees	8.25
	<u>60,941.62</u>

Transferred by Treasury settlements to adjust appropriations 24,518.87

Transferred to medical and hospital department, 1903, by act of June 30, 1902..... 1,000,000.00

Balances on hand June 30, 1903:

In United States Treasury	425,750.29
In hands of disbursing officer, Washington, D. C.	1,131.18
	<u>426,881.47</u>

Total accounted for 1,512,341.96

Medical and hospital department, 1901.

Balances on hand July 1, 1902, acts of May 26, 1900, and March 3, 1901	\$222,434.75
Refundment, balance of disbursing officer's depository account, representing the amount of outstanding checks lost in transit.....	194.50

Total to be accounted for 222,629.25

Disbursed during the year:

Medical attendance and medicines	\$214.50
Medical expenses of recruiting	3.50
Washing of hospital linen	298.66
By Treasury settlement with owner of lost checks covering payments previously classified.....	194.50
	<u>711.16</u>

Transferred by Treasury settlement to miscellaneous receipts to cancel erroneous deposit of proceeds of sales to the credit of this appropriation 20.95

Carried to surplus fund 221,897.14

Total accounted for 222,629.25

Medical and hospital department, 1900 and prior years.

Refunded during the year	\$16.20
Carried to surplus fund	16.20

Medical and hospital department, certified claims.

Appropriated by act approved March 3, 1903.....	\$523.62
Disbursed	523.62

Reimbursement to contract nurses.

Balance on hand July 1, 1902, act of June 6, 1900	\$3,302.68
Disbursed during the year	23.70
Balance in United States Treasury June 30, 1903	3,278.98
Total accounted for	3,302.68

Report of Army Board on origin and spread of typhoid fever, 1903-4.

Appropriated by act approved March 3, 1903	\$24,420.00
Balance in United States Treasury June 30, 1903	24,420.00

Artificial limbs, 1903.

Appropriated by act approved June 28, 1902	\$514,000.00
Disbursed during the year	455,628.24
Balance on hand June 30, 1903	58,371.76

Artificial limbs, 1902.

Balance on hand July 1, 1902, act of March 3, 1901	\$8,815.00
Disbursed during the year	3,897.83
Balance on hand June 30, 1903	4,917.17

Artificial limbs, 1901.

Balance on hand July 1, 1902, act of June 6, 1900	\$10,702.81
Disbursed during the year	472.31
Carried to surplus fund	10,230.50
Total accounted for	10,702.31

Appliances for disabled soldiers, 1903.

Appropriated by act approved June 28, 1902	\$2,000.00
Disbursed during the year	1,075.91
Balance on hand June 30, 1903	924.09

Appliances for disabled soldiers, 1902.

Balance on hand July 1, 1902, act of March 3, 1901	\$624.65
Disbursed during the year	162.63
Balance on hand June 30, 1903	462.02

Appliances for disabled soldiers, 1901.

Balance on hand July 1, 1902, act of June 6, 1900	\$482.48
Carried to surplus fund	482.48

Army Medical Museum, 1903.

Appropriated by act approved June 30, 1902	\$5,000.00
Disbursed during the year	3,537.62
Balance on hand June 30, 1903	1,462.38

Army Medical Museum, 1902.

Balance on hand July 1, 1902, act of March 2, 1901.....	\$2, 161. 56
Disbursed during the year	273. 99
Balance on hand June 30, 1903.....	1, 887. 57

Army Medical Museum, 1901.

Balance on hand July 1, 1902, act of May 26, 1900.....	\$560. 14
Carried to surplus fund.....	560. 14

Library, Surgeon-General's Office, 1903.

Appropriated by act approved June 30, 1902	\$10, 000. 00
Disbursed during the year	7, 798. 47
Balance on hand June 30, 1903.....	2, 201. 53

Library, Surgeon-General's Office, 1902.

Balance on hand July 1, 1902, act of March 2, 1901.....	\$2, 889. 43
Disbursed during the year	2, 871. 10
Balance on hand June 30, 1903.....	18. 33

Library, Surgeon-General's Office, 1901.

Balance on hand July 1, 1902, act of May 26, 1900.....	\$63. 49
Disbursed during the year	4. 55
Carried to surplus fund	58. 94
Total accounted for.....	63. 49

Furnishing trusses to disabled soldiers (sections 1176, 1177, and 1178, Revised Statutes, and act of March 3, 1879).

Balance on hand July 1, 1902	\$1, 380. 43
Drawn during the year	6, 343. 00
Total to be accounted for	7, 723. 43
Disbursed during the year	6, 561. 12
Balance on hand June 30, 1903.....	1, 162. 31
Total accounted for.....	7, 723. 43

Relief of citizens of French West Indies (act approved May 13, 1902).

Balance on hand July 1, 1902, amount drawn by medical department.....	\$5, 000. 00
Disbursed during the year	4, 824. 39
Repaid to appropriation and dropped from books of Surgeon-General's Office	175. 61
Total accounted for.....	5, 000. 00

General summary all appropriations.

Balances on hand July 1, 1902	\$1, 770, 305. 91
Appropriated	562, 286. 62
Refunded.....	7, 725. 99
Total to be accounted for	2, 340, 318. 52

Disbursed	\$976, 292. 68
Transferred to miscellaneous receipts to cancel erroneous deposit	20. 95
Carried to surplus fund	233, 245. 40
Dropped to close account on books of Surgeon-General's Office	175. 61
Balances on hand June 30, 1903,	1, 180, 583. 88
Total accounted for	2, 340, 318. 52

ARTIFICIAL LIMBS AND APPARATUS.

Under the laws relating to artificial limbs, apparatus, or commutation therefor, orders on manufacturers were given during the fiscal year for 270 artificial legs, 6 arms, and 1 apparatus. Commutation certificates were issued for 2,319 cases of amputated leg, 2,446 of amputated arm, 65 of amputated foot, and for 2,714 cases of the loss of use of a limb.

Under the act of June 17, 1870, and subsequent amendment thereto, 22,765 disabled soldiers and sailors have been furnished artificial limbs or apparatus or have received commutation in money, as follows:

Total number benefited to June 30, 1903, 22,765; died, 9,072; dropped from rolls, probably dead, 590; rejected after one or more payments, 537; remaining on rolls June 30, 1903, 12,566.

Limbs have been furnished or commutation paid as follows: Legs, 34,018; arms, 32,886; feet, 963; apparatus for leg, 26,102; apparatus for arm, 35,311.

Only 228 persons disabled since the beginning of the war with Spain are on the list of beneficiaries under these laws, as follows: Amputation both legs, 1; amputation one leg, 80; amputation one foot, 1; amputation one arm, 41; disabled in four limbs, 3; disabled in three limbs, 5; disabled in two limbs, 22; disabled in one limb, 75.

To meet the claims that will arise during the fiscal year ending June 30, 1905, it is estimated that the sum of \$125,000 will be required.

APPLIANCES AND TRUSSES.

One hundred and seventy appliances were issued during the fiscal year, and 932 trusses were furnished and fitted.

CARE OF DESTITUTE PATIENTS IN THE PROVIDENCE HOSPITAL, WASHINGTON, D. C.

The act approved June 28, 1902, having appropriated \$19,000 for the support and medical treatment of destitute patients in the city of Washington, D. C., under contract to be made with Providence Hospital by the Surgeon-General of the Army, the relief afforded was as follows:

Patients in hospital July 1, 1902	101
Admitted during the year	1, 083
Total number treated	1, 184
Average number admitted per month	99
Number remaining in hospital June 30, 1903	114
Total number of days' treatment afforded	39, 573
Average number of days' treatment per patient	34
Average number of patients treated per day	109
Longest term of treatment (days)	365
Shortest term of treatment (day)	1
Number of patients in hospital during the whole year	11

ARMY MEDICAL MUSEUM.

The total number of specimens in the Army Medical Museum at the end of the fiscal year June 30, 1903, was 35,654. The following statement shows in detail the additions and changes in the different sections:

Pathological section:

In museum June 30, 1902	12, 442
Discarded	75
Transferred to miscellaneous section	1
	<hr/> 76
	12, 366
Transferred from anatomical section	3
Transferred from section of comparative anatomy	1
Transferred from provisional pathological section	13
Received during the year	137
	<hr/> 12, 520
In museum June 30, 1903	<hr/> <hr/> 12, 520

Anatomical section:

In museum June 30, 1902	1, 633
Discarded	2
Transferred to pathological section	3
	<hr/> 5
	1, 628
Received during the year	41
	<hr/> 1, 669
In museum June 30, 1903	<hr/> <hr/> 1, 669

Section of comparative anatomy:

In museum June 30, 1902	1, 430
Discarded	12
Transferred to U. S. National Museum	1
Transferred to pathological section	1
	<hr/> 14
In museum June 30, 1903	<hr/> <hr/> 1, 416

Microscopical section:

In museum June 30, 1903	<hr/> <hr/> 12, 916
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Miscellaneous section:

In museum June 30, 1902	2, 605
Transferred from pathological section	1
Received during the year	153
	<hr/> 154
In museum June 30, 1903	<hr/> <hr/> 2, 759

Provisional pathological section:

In museum June 30, 1902	1, 272
Discarded	51
Transferred to U. S. National Museum	3
Donated to physicians	2
Donated to students	9
Transferred to pathological section	13
	<hr/> 78
	1, 194
Received during the year	11
	<hr/> 1, 205
In museum June 30, 1903	<hr/> <hr/> 1, 205

Provisional anatomical section:

In museum June 30, 1902.....	659
Donated to students.....	13

In museum June 30, 1903.....	646
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Photographic series:

In museum June 30, 1902.....	2, 559
Transferred to Bureau of American Ethnology, Smithsonian Institution..	54

2, 505

Received during the year.....	18
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In museum June 30, 1903.....	2, 523
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RECAPITULATION.

Specimens in the museum June 30, 1902.....	35, 516
Discarded, transferred, and donated.....	222

35, 294

Added during the year.....	360
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Specimens in the museum June 30, 1903.....	35, 654
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Of the pathological specimens received during the year the most interesting are the following:

12610. A malformation, rhinocephalus. Contributed by Dr. J. Barsky, New York City.
- 12603, 12604. Pachymeningitis hemorrhagica interna; 2 cases, man and woman, each 55 years old. Contributed by Dr. D. S. Lamb, Washington, D. C.
- 12558, 12592. Cerebral hemorrhage; 2 cases, woman, aged 40, and man, aged 46. Contributed by Dr. D. S. Lamb, Washington, D. C.
12627. Brain, fibro-sarcoma. Contributed by Dr. Frank Leech, Washington, D. C.
- 12594, 12632. The eye, case of panophthalmitis following extraction for cataract and atrophy following injury with pine cone. Contributed by Dr. R. S. Lamb, Washington, D. C.
- 12648, 12649. Miner's lung; 2 cases, one of which shows pneumonia. Contributed by Dr. Charles F. Kieffer, assistant surgeon, U. S. Army.
12653. Pericarditis, extreme case. Contributed by Dr. D. S. Lamb, Washington, D. C.
- 12624-12626. Valvular disease of heart; hypertrophy and dilatation, with large polypoid thrombus; also leukemic spleen and acute parenchymatous nephritis, from which the patient died. Contributed by Dr. I. H. Lamb, Washington, D. C.
12593. Large leukemic spleen. Contributed by Dr. J. B. Nichols, Washington, D. C.
12609. Cast of large fibroma of naso-pharynx; removed in 1875 by Dr. R. P. Lincoln, by galvano-cautery, from boy of 15 years.
12612. Epithelioma of tongue, removed by Dr. D. P. Hickling, Washington, D. C.
12611. Fibrinous cast of esophagus surrounded by hemorrhage. Contributed by Dr. T. C. Smith, Washington, D. C.
- 12595-12597. Primary cancer of stomach, with secondary cancer of liver, and in same case a large retro-peritoneal sarcoma; soldier, aged 74. Contributed by Dr. D. C. Huffman, National Soldiers' Home, Ohio.
12605. Multiple echinococcus cysts of liver. Contributed by Dr. L. T. Le Wald, assistant surgeon, U. S. Army.
12575. Adeno-carcinoma of cecum, removed by Dr. E. A. Balloch, Washington, D. C.
12591. Syphilitic ulceration of rectum, with gonorrheal tubo-ovarian cyst. Contributed by Dr. D. S. Lamb, Washington, D. C.
12628. Congenital cysts of kidney. Contributed by Dr. E. E. Morse, Washington, D. C.
12556. Tubercular kidney and ureter; uretero-nephrectomy; by Dr. J. W. Bovee, Washington, D. C.
12563. Large fibroma of scrotum, removed by Dr. E. A. Balloch, Washington, D. C.
12557. Hypertrophied procident cervix, removed by Dr. J. W. Bovee, Washington, D. C.

12578. Pregnant uterus removed for fibroids, by Dr. W. S. Bowen, Washington, D. C.
 12555. Ectopic pregnancy, two cases—one by Drs. J. Taber Johnson and Robert Reyburn, Washington, D. C., removed by Dr. Johnson on about eightieth day; the other (12608) by Dr. J. W. Bovee, Washington, D. C., at about one and one-half months. Recovery in each case.
 12587. Dentigerous cyst of lower jaw; removed by Dr. R. M. Slaughter, Alexandria, Va.
 12614–12621. A number of pre-Columbian bones showing syphilitic inflammation, from burial mounds in Florida. Contributed by Mr. Clarence B. Moore, Philadelphia, Pa.
 12576. Adeno-carcinoma of male mammary gland, from man aged 66. Removed by Dr. E. A. Balloch, Washington, D. C.
 12569. Perforating ulcer of foot, from a man aged 63, in whose family several persons were also similarly affected. Contributed by Dr. R. F. Sillers, Washington, D. C.
 12560. Large bony cyst wall. Purchased.
 12613. Wood ticks, the *Dermacentor variegatus*, said to carry the germs of spotted fever. Contributed by Dr. P. M. Ashburn, assistant surgeon, U. S. Army.
 12661–12699. Series of 30 "Buchhold" preparations, showing various morbid conditions and animal parasites. Purchased.

Among the interesting additions to the specimens of the anatomical section were:

- 3924–3933. A series of 10 preparations showing the metamorphoses of some lower animals during development, viz, the blindworm snake (*Anguis fragilis*), the crossed snake (*Pelias berus*), the midwife frog (*Alytes obstetricans*), the common toad (*Bufo cinereus*), the toad frog (*Pelobates fuscus*), the Alpine salamander (*Salamandra atra*), the brook trout (*Salmo fario*), and others, made by Pippow Brothers, Berlin.
 3934. Preparation showing the development of the internal ear, made by Lenoir and Forster, Vienna, after the original wax models by Dr. G. Alexander, of Vienna. Enlarged 100 times.
 3935. Preparation showing the anatomy of the internal human ear, made by Lenoir and Forster, of Vienna, under the direction of Dr. G. Alexander and Mr. R. Beck, of Vienna. Enlarged 15 times.
 3937. Model of woman showing the superficial muscles, veins, and arteries and internal and external generative apparatus. Anterior wall of abdomen is detachable, disclosing all the thoracic and abdominal viscera and the organs of generation, all of which are removable. The deeper muscles, nerves, and blood vessels are represented. Prepared by Dr. Auzoux, of Paris, France.

LIBRARY OF THE SURGEON-GENERAL'S OFFICE.

The following table shows the additions made to the library during the fiscal year:

Description.	On hand June 30, 1902.	Added dur- ing fiscal year.	Total June 30, 1903.
	<i>Volumes.</i>	<i>Volumes.</i>	<i>Volumes.</i>
Medical journals	43, 275	1, 419	44, 694
Medical transactions	6, 972	206	7, 178
Bound theses	2, 154	94	2, 248
Bound pamphlets	2, 866	4	2, 870
Other medical books	89, 583	1, 884	91, 417
Total	144, 800	3, 607	148, 407
Medical theses	63, 899	2, 468	66, 367
Medical pamphlets	179, 978	7, 228	187, 206
Total	243, 877	9, 686	253, 563

Of the total number of theses on hand June 30, 1902, there were 1,124 bound in 94 volumes during the year.

There were presented to the library during the year 511 books and 10,244 pamphlets and journals.

Volume VIII, second series of the Index Catalogue, includes the letters I, J, and K, from *Insane* to *Kythospitalet*, and forms a volume of 894 pages. It will be ready for distribution at the usual time. The appropriation for Volume IX, second series, having been made, the manuscript is in course of preparation for the printer.

HOSPITAL CONSTRUCTION AND REPAIR.

During the fiscal year a new modern hospital was completed at Fort Miley, Cal., and new hospitals contracted for at Fort Banks, Mass., and Fort Greble, R. I. Plans and specifications were also prepared for hospitals to be erected at Fort Rosecrans, Cal.; Fort Des Moines, Iowa; Fort Worden, Wash.; Haines Mission, Alaska; Chickamauga Park, Ga., and Fort Lincoln, N. Dak. Some of these are now in course of erection and proposals are being invited for others.

The hospitals at Fort Hancock, N. J.; Fort Hunt, Va., and Fort Dade, Fla., have been added to, and necessary minor additions and repairs made to hospitals at other military posts.

The general hospital at Fort Bayard, N. Mex., has been enlarged and improved by the following buildings, which are now under contract: Hospital-corps barracks, laboratory, quartermaster's storehouse, medical storehouse, cold-storage plant, crematory, receiving vault, morgue, addition to enlisted men's infirmary, and an addition to officers' infirmary. An electric-lighting plant is being established, the reservoir enlarged, and authority has been given to remodel the plumbing throughout the various buildings, besides for such painting and general repairs as are needed to place the buildings in a proper sanitary condition. An administration building, laundry, chapel, dining rooms, and a few minor structures are required to complete the plan of this hospital and make it a model of its kind for the treatment of tuberculosis patients.

At the general hospital, Presidio of San Francisco, Cal., many improvements have been authorized, such as an excellent operating pavilion, a dormitory, a storehouse for medical property, extensions to wards and to the morgue; also general repairs to plumbing, heating, electric wiring, pathological laboratory, ice machine, etc.

In addition to the foregoing, plans and specifications were prepared for new hospitals to be erected at Fort Flagler, Wash.; Fort Caswell, N. C.; Vancouver Barracks, Wash., and Fort Mackenzie, Wyo. Plans and specifications were also prepared for additions to the hospitals at Fort Wadsworth, N. Y.; Fort Ethan Allen, Vt., and Fort Slocum, N. Y., and proposals for these structures are now being invited in the usual manner.

New quarters for hospital stewards are in course of erection at Plattsburg Barracks, N. Y., and Fort Wadsworth, N. Y. The quarters at Fort Morgan, Ala., have been enlarged and all necessary repairs made to these buildings at the various military posts. New quarters are needed at Fort Riley, Kans.; Fort Mason, Cal.; Fort Banks, Mass.; Fort Meade, S. Dak., and Fort Robinson, Nebr.

MEDICAL OFFICERS, UNITED STATES ARMY.

By the appointment of Major Gorgas to the position of colonel, assistant surgeon-general, the total allowance of medical officers is now 322. On June 30, 1903, the number in service was 287, leaving 35 vacancies to be filled.

The following changes occurred during the fiscal year:

Appointments.—One colonel, assistant surgeon-general, to be Surgeon-General; 1 major, surgeon, to be colonel, assistant surgeon-general (special act, approved March 3, 1903), and 25 first lieutenants, assistant surgeons.

Promotions.—Two lieutenant colonels, deputy surgeons-general, to be colonels, assistant surgeons-general; 2 majors, surgeons, to be lieutenant-colonels, deputy surgeons-general; 6 captains, assistant surgeons, to be majors, surgeons; 4 assistant surgeons, first lieutenants, to be captains, assistant surgeons.

Resignations.—Four first lieutenants, assistant surgeons.

Retirements.—One brigadier-general, Surgeon-General; 1 colonel, assistant surgeon-general; 1 major, surgeon.

Died.—Two majors, surgeons; 1 captain, assistant surgeon, viz, Maj. James C. Merrill, surgeon, U. S. Army, of uremia, at Washington, D. C., October 27, 1902.

Maj. Walter Reed, surgeon, U. S. Army, of appendicitis, at Washington Barracks, D. C., November 23, 1902.

Capt. Franklin M. Kemp, assistant surgeon, U. S. Army, of heart disease, at Nueva Caceres, P. I., February 23, 1903.

Army medical boards for the examination of candidates for appointment in the Medical Corps of the Army have been in session during portions of the fiscal year in Washington, D. C., San Francisco, Cal., and Manila, P. I. The following is a summary of the work performed by each board:

Washington, D. C.:

Number of candidates invited to appear	192
Declined to appear	16
Failed to appear	35
	<hr/> 51

Number of candidates examined	141
-------------------------------------	-----

Approved	34
Physically disqualified	34
Withdrew	56
Rejected	17

San Francisco, Cal.:

Number of candidates invited to appear	23
Declined to appear	1
Failed to appear	4
	<hr/> 5

Number of candidates examined	18
-------------------------------------	----

Approved	2
Physically disqualified	1
Withdrew	10
Rejected	5

Manila, P. I.:

Number of candidates examined	17
Approved	4
Physically disqualified	2
Withdrew	11

Of 176 candidates examined by these boards 37 were rejected as disqualified physically, 99 withdrew during the progress of the examination or were rejected on its conclusion, and 40 were found physically and professionally qualified and approved for appointment in the Medical Corps of the Army. The percentage of candidates approved by these boards has still further increased during the fiscal year ended June 30, 1903, to 22.73 per cent, while among candidates examined by the board in Washington the proportion of approved candidates has increased from 19.05 per cent to 24.11 per cent, notwithstanding the fact that the high standard of examination has been fully maintained.

It appears that the vacancies in the grade of assistant surgeon are being slowly filled, but that there is a small but steady loss by resignation of some of the most highly trained young medical officers because prospects in civil practice appear to them brighter and results less remote than in military life. In the Medical Corps, as at present constituted, in my opinion, too large a number of assistant surgeons compared with officers of higher grades is allowed. The present proportion, 3 to 1, is such that the junior medical officer must expect to serve about twenty-six years before promotion to the position of surgeon, whereas formerly, when the ratio was less than 2 to 1, he could confidently hope to be a surgeon in from seventeen to twenty years, with the rank and pay of major, a reward certainly modest enough when the high requirements of the Department are met. I can not but believe it to be necessary, if the corps is to be maintained in the highest possible state of efficiency, that all its functions should be performed by commissioned officers. While the employment of civilian physicians under contract is generally satisfactory as far as strictly professional work is concerned, the position of these gentlemen is at best anomalous and the legality of their actions in controlling men and fulfilling other necessary functions of an officer is often questioned. A medical corps not only adequate in number for the full strength of the Army at home and abroad, but which will allow for the administration of the Department in time of war when the military forces may be indefinitely increased, is much to be desired.

The proportion of officers of different rank should, in my opinion, be such that about twenty years service as an assistant surgeon would be the maximum.

The number of medical officers of superior rank should, in my judgment, be about as follows: Ten assistant surgeons-general, 18 deputy surgeons-general, and 75 surgeons. This estimate is based upon the present strength of the Army and its distribution by geographical departments, and upon the number of important posts, general hospitals, service schools, and supply depots now existing. Without increase in the total number of medical officers allowed by law the above number in the superior grades would nearly restore the former proportion of 2 assistant surgeons to 1 surgeon or higher.

THE ARMY MEDICAL SCHOOL.

The sixth session opened November 10, 1902, and closed April 14, 1903. The class consisted of 40 students, all of whom were assistant surgeons, U. S. Army, 37 having been appointed in 1902, 2 in 1901, and 1 in 1900. Six of the student officers were recently from the Philippine Islands, where they had served as contract surgeons and assistant surgeons, U. S. Army.

The personnel of the faculty during the session was as follows:

Col. Calvin De Witt, assistant surgeon-general, U. S. Army, president of the faculty and professor of military medicine.

Maj. Walter Reed, surgeon, U. S. Army, professor of clinical and sanitary microscopy and director of pathological laboratory.

Maj. Louis A. La Garde, surgeon, U. S. Army, professor of ophthalmology and skiascopy and lecturer on duties of medical officers in war and peace.

Maj. William C. Borden, surgeon, U. S. Army, professor of military surgery, demonstrator in operations on the cadaver and in surgical clinics.

Maj. Walter D. McCaw, surgeon, U. S. Army, professor of military hygiene.

Capt. Frederick P. Reynolds, assistant surgeon, U. S. Army, instructor in hospital corps drill and first aid to wounded.

Capt. Carl R. Darnall, assistant surgeon, U. S. Army, assistant professor of hygiene, instructor in sanitary chemistry, in charge of chemical laboratory, secretary of the faculty.

Upon the death of Maj. Walter Reed, November 23, 1902, First Lieut. James Carroll, assistant surgeon, U. S. Army, was detailed as professor of bacteriology and clinical microscopy, and in that capacity continued and concluded the course.

In addition to the above, Capt. Henry A. Shaw, assistant surgeon, U. S. Army, assisted the professor in military surgery in demonstrating surgical operations on the cadaver.

Capt. Frederick P. Reynolds, assistant surgeon, U. S. Army, in addition to his duties as instructor in hospital corps drill, etc., gave very valuable and systematic instructions to the class in the preparation of the various reports and records required of a medical officer.

First Lieut. James H. Ford, assistant surgeon, U. S. Army, gave seven lectures on tropical diseases.

The following additional courses were given at the invitation of the Surgeon-General, and for them the thanks of the faculty and the student officers are tendered:

Brig. Gen. George B. Davis, judge-advocate-general, U. S. Army, a course of most instructive lectures on military law and court-martial; Robert Fletcher, M. D., F. R. C. S., assistant librarian of the library of the Surgeon-General's Office, on the formation and classification of the library of the Surgeon General's Office, its uses, and its index catalogue.

The need of instruction of the student officers in equitation being apparent, after some correspondence, Capt. John P. Wade, Second U. S. Cavalry, stationed at Fort Myer, Va., was detailed for that purpose, and on the afternoon of Saturday, January 3, 1903, at 2 o'clock the course was begun and continued from 2 to 4 p. m. every Saturday

thereafter until March 28, 1903. This course was most valuable as some of the student officers had never before been on horseback and very few were expert horsemen. Captain Wade, by his interest, patience, and kindness won the gratitude of every student who came under his instruction.

The school hours were from 9 a. m. to 12 m. and from 1 to 4 p. m., every other day being devoted to laboratory work. As the class was the largest assembled since the establishment of the school, it was necessary to divide it into two sections; in this way one section received instruction in the bacteriological laboratory, while the other was engaged in the chemical laboratory, the sections being changed during the afternoon.

On Saturdays from 9 a. m. to 12 m. instructions in first aid and hospital corps drill were given at Washington Barracks, and in the afternoon from 2 to 4 p. m. lessons in equitation in the riding hall at Fort Myer, Va.

The biological and chemical laboratories were completely equipped with apparatus and provided with all material necessary for the thorough instruction of the students. In the early part of the session, when preliminary work in chemistry demanded the close attention of the instructor in watching over and aiding the individual students, valuable assistance was given by Dr. E. R. Hodge, chemist of the Surgeon-General's Office, whose laboratory is in the same building, and adjacent to that of the school.

In addition to the large 16-inch-plate static machine, there was placed in the X-ray room of the Army Medical Museum and Library Building, near the close of the session, a "coil machine," with different patterns of interrupters, for producing the X-rays for the instruction of the student officers. Demonstrations in the management of these machines, also in taking and developing skiagraphs, were given by Dr. W. M. Gray, of the Army Medical Museum, under direction of Major La Garde.

At the request of the Surgeon-General of the Navy, similar demonstrations were given to the student officers of the Naval Medical School. These instructions were supplemented by two lectures on the principles of the X-ray to the students of each school by Maj. W. C. Borden, surgeon, U. S. Army.

By the courtesy of the faculty of the Navy School the student officers of the Army Medical School had the privilege of hearing a lecture of Mr. Howard, of the Agricultural Department, on mosquitoes.

Meetings of the faculty were regularly held for the transaction of business, and all actions taken were immediately referred to the Surgeon-General, when necessary.

The final examinations began March 30, 1903, and continued daily (Sundays excepted) until April 7, 1903, and after consideration by the faculty the relative proficiency of the student officers and their final standing in the class were determined.

The faculty had resolved that the student officers who should attain a standing of not less than 90 per cent in their total markings were entitled to the distinction "proficient with honor." This percentage was gained by four students, including the winner of the "Alexander H. Hoff memorial gold medal," which was awarded to First Lieut. Harry L. Gilchrist, assistant surgeon, U. S. Army, the student officer

who received the highest marking at the final examination. The remaining "honor graduates" were Lieuts. S. M. De Loffre, J. W. Hanner, and E. M. Talbott. An average of 70 per cent was fixed as the minimum for graduation as "proficient," which was attained by all the class with the exception of one officer.

The closing exercises were held in the lecture hall of the U. S. National Museum, the use of which was permitted by the courtesy of the Board of Regents of the Smithsonian Institution.

The address was made by Lieut. Col. John S. Billings, deputy surgeon general, U. S. Army, retired. The certificates of graduation were given by the Hon. Elihu Root, Secretary of War, and the Hoff medal was presented to First Lieut. Harry L. Gilchrist by Brig. Gen. William H. Carter, U. S. Army, of the War College Board.

The invocation was made and the benediction pronounced by the Rev. Charles C. Pierce, chaplain, U. S. Army. The commanding officer, Maj. W. C. Black, U. S. Engineers, of the Engineer Battalion, Washington Barracks, kindly sent the band, which furnished excellent music.

The distinctive features of the course of instruction at the school are, first, the large measure of personal attention paid to the student's individual work by instructors in the laboratories and surgical demonstrators, which it is believed is not exceeded, if equalled, in any post-graduate school, and, second, the special preparation of the young assistant surgeon in his military duties as administrator, sanitarian, and officer of the Army, his responsibilities to and relations with officers of the line and staff, with enlisted men, and with the families of both, being carefully taught.

That the student officers fully appreciated the fact that their previous medical education was thus added to and completed, and that their future path of duty was made much smoother for them, is evinced by the attention and industry displayed at this last session.

The probable value of the young officer's future services may be so much better estimated after he has taken this course than before that I have now under consideration a plan by which all candidates for commission in the Medical Corps may receive this instruction as contract surgeons after examination, and by which the final recommendations for commissions shall be contingent upon their successfully passing the examinations of the school. It is believed that no additional legislation is needed to carry out this plan, which will be submitted in due time.

MEDICAL OFFICERS, VOLUNTEERS.

The provisions of the act of Congress approved February 2, 1901, allowing 50 surgeons of volunteers with rank of major and 150 assistant surgeons of volunteers with rank of captain, having expired February 1, 1903, all these medical officers were honorably discharged on or before that date. With very few exceptions their services had been most creditable, and in some cases of an exceptionally high order. Many of the volunteer medical officers acquired such a strong love for military service that, with the consent of the Secretary of War, the age limit of candidates for entrance into the Medical Corps was raised, in the case of ex-volunteers with honorable record, to include all those who were under 42 years at date of original entry into service.

Five ex-volunteer medical officers have successfully passed the examinations since February 1, 1903, and have been recommended for commission.

During the fiscal year 49 majors, surgeons of volunteers, were honorably discharged, 5 of these returning to the position of captain, assistant surgeon, U. S. Army. One major, surgeon, volunteers, was discharged on tender of resignation; 148 captains, assistant surgeons, were honorably discharged, and 2 captains, Frederick W. Cox and Frederick C. Jackson, died in service.

CONTRACT SURGEONS, U. S. ARMY.

There were 273 contract surgeons in service at the close of the fiscal year ended June 30, 1902, and during the past fiscal year contracts were made with 61 physicians, 103 annulled, and 2 terminated by death, leaving 229 in service June 30, 1903.

Very few contracts have been made except with ex-medical officers of volunteers, whose services of proved value it was desirable to retain, and by far the greater number of these are still on duty in the Philippine Islands. The net loss for the fiscal year was 44, and the number now in service will be still further reduced in the near future.

Contract Surg. Joseph J. Curry died of tuberculosis at the general hospital, Fort Bayard, N. Mex., January 21, 1903, and Contract Surg. Robert M. Enders, Sr., of nephritis, at Manila, P. I., May 24, 1903.

CONTRACT DENTAL SURGEONS.

The number of contract dental surgeons allowed by the act of Congress approved February 2, 1901, is 30. The number in service December 31, 1901, was 28. On June 30, 1902, the complement allowed by law was complete. The distribution of dental surgeons at the close of the fiscal year ending June 30, 1903, is as follows: United States, 12; Philippine Islands, 18; total, 30.

During the period January 1, 1902, to December 31, 1902, the following changes have taken place in the personnel of the corps:

Gain:		
Appointments by contract	5	
Loss:		
By death	1	
By annulment of contract	2	
Total	3	
Increase	2	
Promotions	1	
Total number in the service	30	

Dr. Charles A. Petre, contract dental surgeon, U. S. Army, died on February 12, 1902, at Aparri, Cagayan, P. I., of pyo-nephritis and intestinal obstruction after a few days illness. One contract examining and supervising dental surgeon left the service on account of ill health, one dental surgeon was promoted to this vacancy, and one left the service to accept a second lieutenant's commission in the line.

The board for the examination of candidates for appointment as contract dental surgeons, U. S. Army, has been in session from time to

time as candidates were invited to appear for examination. The following is a summary of the work performed by the individual members of the board:

Number of candidates invited to appear for examination.....	26
Declined to appear.....	0
Failed to appear.....	1
Number of candidates examined.....	25
Result:	Per cent.
Approved.....	9 or 36
Physically disqualified.....	2 or 8
Rejected.....	7 or 28
Withdrew.....	7 or 28
Total.....	25
Declined to enter into contract.....	1
Number on waiting list.....	3

The percentage of candidates found qualified and approved was somewhat higher than for the year ending December 31, 1901. The report of the board for that period shows that the approved candidates formed 27½ per cent of the number examined, while this report shows 36 per cent. The increase is accounted for by the fact that the candidates who appeared before the board during its sessions in Washington, D. C., were largely made up of recent graduates, while in the period covered by this report they were generally better qualified and many of them were men of from two to six years professional experience, which fact naturally gave them a decided advantage in the practical departments.

The following tabulated statistics of the number of patients treated for dental caries and other dental and oral diseases and injuries for the year—January 1, 1902, to December 31, 1902, inclusive—abundantly prove the great prevalence of such diseases among our troops and the need of dental and oral treatment. The whole number of officers (regular and volunteer), enlisted men, female nurses, and general prisoners of the Army treated during this period by dental surgeons is 16,161, or 20 per cent of the mean strength of the entire Army, while operations and treatments upon the teeth, gums, mouth, and jaws reach the large number of 49,483, an average of 3.06 operations for each person treated.

SUMMARY.

Whole number of patients treated and operations performed or treatments given.

	Regulars.	Volunteers.	Operations.
United States.....	6,982	8	18,971
Philippine Islands.....	8,102	51	28,115
Cuba and Porto Rico.....	1,068	.....	2,897
Total.....	16,102	59	49,483

By direction of the Chief Surgeon, Division of the Philippines, March 1, 1902, dental surgeons were instructed to extend the courtesy of their services to such officers and enlisted men of the Marine Corps as might be in need of dental treatment, "for the relief of suffering only." This courtesy was also extended to naval officers and enlisted men, in some instances, by direction of the commanding officer of the

brigade, or by the chief surgeon of the department, near which they were operating. No report has been made of the number of persons so treated, except in the single instance of the dental surgeon stationed at Tacloban, Leyte.

Whole number of patients treated during the year, January 1, 1902 to December 31, 1902, inclusive.

	United States.	Philippine Islands.	Cuba. ^a	Porto Rico.	Total.
Regulars:					
Officers.....	691	808	68	59	1,621
Cadets.....	103				103
Enlisted men.....	6,069	7,248	589	407	14,268
Volunteers:					
Officers ^b	8	51			59
Enlisted men ^c					
Nurses:					
Army nurse corps.....	37	13			50
General prisoners.....	42	83			75
Total.....	6,940	8,153	602	466	16,161
Civilian attaches:					
Male.....	66	48	24	14	152
Female.....	137	19	2	2	160
Children.....	5				6
Total.....	208	67	26	16	317
Grand total.....	7,148	8,220	628	482	16,478

^a Report is for January, February, March, and April, 1902, only.

^b Medical officers only.

^c None in service.

UNITED STATES NAVY.

	United States.	Philippine Islands.	Cuba.	Porto Rico.	Total.
Officers.....		4			4
Naval cadets.....		2			2
Enlisted men.....		11			11
Total.....		17			17

PREVALENCE OF DENTAL AND ORAL DISEASES.

The prevalence of dental caries and other dental and oral diseases among the troops, as shown by the following tabulated statistics, is very marked, and when the fact is taken into account that officers and enlisted men have been chosen for service after a rigid examination to determine their physical perfection, and that all but those in perfect health and of good physical development are rejected, it seems evident that excessive physical and mental strain predisposes the individual to dental diseases and that great care should be exercised in the examination of the teeth, a full complement of these organs in a sound condition being such important factors in maintaining the general health of the individual.

It is the general opinion of dental practitioners and pathologists that dental diseases are rapidly increasing, and that there is a marked diminution in the resistive power of the teeth against disease. For this reason measures are being taken to teach the enlisted men the

value of a proper care of the teeth and mouth, as cleanliness of the oral cavity is a very important prophylactic measure, not only for the preservation of the teeth, but for the prevention of numerous other diseases, particularly of the mouth and throat and of the digestive system. As a means of comparison the following statistics are quoted:

The prevalence of dental caries among American grammar-school boys, according to statistics published in 1890, is 27.33 per cent. In an examination of the naval apprentices of the British training ship *Exmouth*, made at about the same period, the average age of the boys being about 14 years, it was found that 76 per cent had carious teeth, while in a recent examination of the teeth of the school children of northern Germany, whose ages were between 12 and 15 years, it was found that 94.5 per cent of them had dental caries in its various stages of development.

These statistics show conclusively the great prevalence of dental caries and its widespread dissemination among the Anglo-Saxons and Germans, who make up the great bulk of the Army. Dental diseases appear to be as prevalent among the officers and enlisted men of the Army as among individuals in civil life of the same social class, while with the troops who have served in the Philippines these diseases are much more prevalent, as a reference to the "Recapitulation of diseases and operations" will show. The increased percentage of dental diseases among the troops in the Philippine Islands over those stationed in the United States is 18.27, while among the troops in Cuba and Porto Rico it is 21.17. The increased percentage in Cuba and Porto Rico over those stationed in the Philippine Islands is due to the fact that these diseases are much more prevalent among the native troops of Porto Rico than among the white troops. Good, or at least serviceable, teeth are very necessary as a means of maintaining the general health, and consequently the highest efficiency, of an army, particularly when campaigning in the tropics, where conditions of the climate and necessary changes in the habits of life are so enervating and debilitating to the general system. Resistance to disease under these conditions is greatly lessened and the individual is consequently predisposed to a certain class of diseases, among which are dental caries, pulpitis, pericementitis, dento-alveolar abscess, pyorrhea alveolaris, necrosis of the jaws, and inflammatory and ulcerative conditions of the gums, of the oral mucous membrane, the throat, and tongue.

The following tables show the diseases and injuries treated during the year:

REGULARS.

Diseases and injuries of the teeth and gums.

	United States.	Philippine Islands.	Cuba and Porto Rico.	Total.
Abrasion, mechanical.....	1	30	3	34
Abscess of the jaw, associated with impacted teeth.....	51	29	1	81
Calcification of the pulp.....	1	6	.....	7
Caries.....	11,206	18,626	1,260	31,092
Cysts of the jaw, associated with devitalized teeth.....	2	7	.....	9
Defective fillings.....	3	10	.....	13
Dento-alveolar abscess.....	1,250	1,224	196	2,670
Devitalized pulp.....	631	146	48	825
Dislocation of teeth.....	8	3	.....	11
Erosion, chemical.....	10	8	.....	18
Erupting teeth (painful).....	97	24	.....	121
Fracture of the teeth.....	92	80	7	179
Hemorrhage, following extraction.....	6	7	.....	12
Hypertrophy of the gums.....	15	39	4	58
Hypertrophy of the pulp.....	7	17	1	25

Disease and injury of the teeth and gums—Continued.

	United States.	Philippine Islands.	Cuba and Porto Rico.	Total.
Hypercementosis	8	4	1	8
Impacted teeth	32	18	6	56
Irregularities of the teeth	21	25	2	48
Necrosis of the teeth	77	565	1	643
Pericementitis:				
Acute	154	134	64	352
Chronic	120	151	11	282
Pyorrhea alveolaris	214	296	17	527
Resorption of the alveolar process	27	51	.....	78
Recession of the gums	1	46	6	52
Salivary deposits	1,060	2,090	236	3,386
Sensitive dentine	34	2	.....	36
Supernumerary teeth	4	12	2	18
Pulp nodules	2	2	.....	4
Pulpitis:				
Acute	1,029	1,687	148	2,864
Chronic	316	425	45	786
Total	16,523	25,764	2,058	44,345

Diseases and injuries of the mouth and jaws.

Cleft palate, hard	4	.....	.....	4
Empyema of the antrum (suppurative)	6	4	.....	10
Fracture of the alveolar process	4	.....	.....	4
Fracture of the jaws:				
Superior	2	.....	.....	2
Inferior	6	3	.....	9
Fracture of the jaws, gunshot wound, inferior	1	.....	.....	1
Gingivitis:				
Simple	88	111	4	203
Ulcerative	91	11	.....	102
Leucoplakia buccalis	2	.....	.....	2
Mucous engorgement of antrum	3	.....	.....	3
Necrosis of jaws:				
Superior	2	2	6	10
Inferior	2	.....	1	3
Neuralgia, facial	2	7	1	10
Osteitis, acute, resulting from impaction .....	.....	1	.....	1
Periostitis of jaw:				
Superior	9	.....	13	22
Inferior	11	3	10	24
Stomatitis:				
Infectious	1	.....	1	2
Simple	5	11	1	17
Ulcerative	45	21	.....	66
Ulcerative syphilitic	1	.....	1	2
Tumors of the jaws (radicular odontome) .....	.....	.....	1	1
Total	285	174	39	498

CHARACTER OF SERVICE.

The character of the services of the dental surgeons has changed considerably since the period covered by the last report. Then it was largely of an emergency nature, the chief aim and effort being to give relief from suffering and to return the men to duty with the least possible delay. Now, with the full complement of dental surgeons on duty, more time and attention are devoted to teaching methods of prophylaxis, to conserving the teeth by proper treatment of diseased conditions, restoring them to usefulness by inserting appropriate fillings, and replacing lost teeth by suitable crowns, bridges, or artificial dentures.

The following tables show the number and character of the operations performed by the dental surgeons for the troops in the United States, the Philippine Islands, Cuba, and Porto Rico:

Operations upon the teeth and gums.

	United States.	Philippine Islands.	Cuba and Porto Rico.	Total.
Abscesses lanced	94	101	21	216
Excision of the gums	42	22	5	69
Pulp, capped	87	43	10	140
Pulp, devitalized	941	1,343	137	2,421
Pulp, extirpated	638	1,155	183	1,976
Root canals filled with gutta-percha	980	1,339	36	2,355
Salivary deposits removed	1,060	2,090	236	3,386
Teeth extracted	2,017	3,632	394	6,043
Teeth treated, medicated	3,339	3,517	366	7,212
Total	9,198	13,242	1,388	23,818

Operations upon the mouth and jaws.

Cleft palate, hard	4			4
Empyema of the antrum	26	4		30
Leucoplakia buccalis	2			2
Mucous engorgement of antrum	3			3
Necrosis of the jaw:				
Superior	2	2	6	10
Inferior	2		1	3
Periostitis:				
Superior	9		13	22
Inferior	11	3	10	24
Tumors of the gums				
Tumors of the jaws			1	1
Total	59	9	31	99

Restorations by fillings.

Amalgam	6,398	7,578	420	14,396
Gold	939	1,586	172	2,697
Gutta-percha	192	432	34	658
Oxyphosphate	1,259	4,072	234	5,565
Tin		22		22
Total	8,788	13,690	860	23,338

Restorations by combination fillings.

Gutta-percha and oxyphosphate	39	84	6	129
Gutta-percha and amalgam	87	105	2	194
Oxyphosphate and amalgam	896	589	6	991
Total	522	778	14	1,314

Restorations by bridges and crowns.

Bridges:				
Gold and porcelain	4	5	19	28
Gold	65	22	20	107
Reset	39	20	8	67
Crowns:				
Logan	62	27	14	103
Gold shell	73	104	20	197
Richmond	15	4		19
Reset	36	20	9	65
Total	294	202	90	586

Restorations by artificial denture.

	United States.	Philippine Islands.	Cuba and Porto Rico.	Total.
Dentures:				
Vulcanite, partial.....	66	48	8	117
Vulcanite, full.....	1	2	1	4
Broken plate repaired	13	8	4	25
Total.....	80	58	13	146

Mechanical appliances for fractured jaws.

Angle appliance	2	.....	.....	2
Kingsley splint vulcanite	4	1	1	6
Metal splint.....	1	.....	.....	1
Total.....	7	1	1	9
Grand total of operations	18,968	27,976	2,897	49,820

UNITED STATES VOLUNTEERS.

Diseases and injuries of the teeth and gums.

	United States.	Philippine Islands.	Cuba and Porto Rico.	Total.
Caries.....	9	106	.....	114
Defective fillings.....	.....	2	.....	2
Dento-alveolar abscess.....	.....	6	.....	6
Devitalized pulp.....	.....	3	.....	3
Hypertrophy of the pulp.....	.....	1	.....	1
Necrosis of the teeth.....	.....	3	.....	3
Pulpitis, acute.....	.....	9	.....	9
Pulpitis, chronic.....	.....	4	.....	4
Pyorrhea, alveolaris.....	6	.....	.....	6
Recession of the gums.....	.....	1	.....	1
Salivary deposits.....	3	13	.....	16
Total.....	18	147	.....	165

Operations upon the teeth and jaws.

Root canals filled with gutta-percha.....	.....	11	.....	11
Salivary deposits removed.....	3	13	.....	16
Teeth extracted.....	.....	14	.....	14
Teeth treated, medicated.....	6	14	.....	20
Total.....	9	52	.....	61

Restorations by fillings.

Amalgam.....	10	53	.....	63
Gold.....	.....	17	.....	17
Gutta-percha.....	.....	1	.....	1
Oxyphosphat.....	2	12	.....	14
Total.....	12	83	.....	95

Restorations by combination fillings.

	United States.	Philippine Islands.	Cuba and Porto Rico.	Total.
Gutta-percha and oxyphosphate.....	1	.....	.....	1
• Total.....	1	.....	.....	1

Restorations by bridges and crowns.

Crowns:				
Gold shell.....		3	.....	3
Richmond.....	1	2	.....	3
Total.....	1	5	.....	6
Grand total of all operations on United States Volunteers.....	23	140	.....	163

RECAPITULATION OF DISEASES AND OPERATIONS.

	United States.	Philippine Islands.	Cuba and Porto Rico.	Total.
Mean strength of troops on duty during year 1902.....	39,736	37,768	3,274	80,778
Total diseases and injuries treated.....	16,828	28,085	2,097	45,008
Percentage.....	42.85	61.12	64.02	55.72
Total operations.....	18,971	28,115	2,397	49,483
Percentage.....	47.74	74.44	73.32	61.26

The large number of teeth reported as extracted in the United States and the Philippine Islands is due to the great prevalence of dental caries of an acute type among troops serving in the tropics or recently returned, which causes a very rapid destruction of teeth, making extraction necessary, because movement of troops would not in many cases permit the delay required to properly treat and fill them. It has been repeatedly impressed upon the dental surgeons by the members of the supervising board that their "chief duty was the conservation of the teeth," and that "no tooth should be extracted that gave any promise of responding to treatment or being restored to usefulness by appropriate filling or crowning, provided the individual could devote the proper amount of time and attention to the necessary treatment." The comparatively small number of restorations of teeth by crowning, bridging, and the insertion of artificial dentures is due to the fact that a majority of the dental surgeons are only furnished with an operating outfit. The mechanical laboratory is too cumbersome to be transported from station to station in the ordinary itinerary of dental surgeons, consequently all cases needing prosthetic treatment are sent to the base stations in the Philippines and to such general hospitals and large stations in the United States as have a dental surgeon on constant duty.

The following tables, compiled from 31,092 cases of dental caries treated by dental surgeons during the period covered by this report by filling or extracting, show the susceptibility of the individual teeth to this disease in troops serving in the United States, the Philippine Islands, and Cuba and Porto Rico:

Table of susceptibility to dental caries of individual teeth of troops in the United States.

Classification.	Caries.			Percentage.		
	Right.	Left.	Total.	Right.	Left.	Total.
Central incisors.....	upper.. 489	487	926	8.02	8.50	8.26
	lower.. 28	28	46	.42	.40	.41
Lateral incisors.....	upper.. 381	414	795	6.96	7.28	7.09
	lower.. 26	28	54	.47	.49	.48
Cuspidæ.....	upper.. 166	186	352	3.03	3.25	3.14
	lower.. 37	36	73	.68	.63	.65
First bicuspidæ.....	upper.. 408	420	828	7.45	7.33	7.39
	lower.. 109	115	224	1.99	2.01	2.00
Second bicuspidæ.....	upper.. 476	501	977	8.69	8.74	8.72
	lower.. 299	273	572	5.46	4.76	5.10
First molars.....	upper.. 810	788	1,598	14.79	13.66	14.22
	lower.. 686	664	1,350	12.53	11.59	12.05
Second molars.....	upper.. 522	601	1,123	9.53	10.49	10.01
	lower.. 674	736	1,410	12.31	12.84	12.58
Third molars.....	upper.. 172	187	359	3.14	3.26	3.20
	lower.. 248	276	524	4.53	4.82	4.67
Total.....	5,476	5,730	11,206			

SUMMARY.

	Number.	Per cent.
Upper.....	6,953	62.05
Lower.....	4,253	37.95
Total.....	11,206	
Right.....	5,476	48.87
Left.....	5,730	51.13
Total.....	11,206	

Table of susceptibility to dental caries of individual teeth of troops in the Philippine Islands.

Classification.	Caries.			Percentage.		
	Right.	Left.	Total.	Right.	Left.	Total.
Central incisors.....	upper.. 975	896	1,871	10.60	9.51	10.06
	lower.. 45	62	107	.49	.66	.58
Lateral incisors.....	upper.. 780	770	1,550	7.93	8.18	8.05
	lower.. 55	57	112	.60	.61	.60
Cuspidæ.....	upper.. 818	824	1,642	4.45	3.44	3.44
	lower.. 61	52	113	.66	.55	.61
First bicuspidæ.....	upper.. 736	757	1,493	7.99	8.04	8.01
	lower.. 210	188	398	2.28	1.99	2.13
Second bicuspidæ.....	upper.. 785	826	1,611	8.53	8.77	8.65
	lower.. 392	423	815	4.26	4.49	4.38
First molars.....	upper.. 1,271	1,302	2,573	13.80	13.82	13.81
	lower.. 1,110	1,074	2,184	12.06	11.40	11.73
Second molars.....	upper.. 836	876	1,712	9.08	9.30	9.19
	lower.. 1,056	1,125	2,181	11.47	11.94	11.71
Third molars.....	upper.. 260	233	493	2.82	2.47	2.65
	lower.. 367	454	821	3.99	4.82	4.40
Total.....	9,207	9,419	18,626			

SUMMARY.

	Number.	Per cent.
Upper.....	11,895	63.86
Lower.....	6,731	36.14
Total.....	18,626	
Right.....	9,207	49.43
Left.....	9,419	50.56
Total.....	18,626	

Table of susceptibility to dental caries of individual teeth of troops in Cuba and Porto Rico.

Classification.		Caries.			Percentage.		
		Right.	Left.	Total.	Right.	Left.	Total.
Central incisors.....	upper..	75	83	158	12.52	12.56	12.54
	lower..	3	5	8	.50	.76	.63
Lateral incisors.....	upper..	64	64	128	10.68	9.68	10.18
	lower..	5	6	11	.88	.91	.87
Cuspids.....	upper..	27	40	67	4.51	6.05	5.28
	lower..	4	6	10	.67	.91	.79
First bicuspsids.....	upper..	35	43	78	5.84	6.51	6.18
	lower..	18	18	36	3.00	2.72	2.86
Second bicuspsids.....	upper..	36	46	82	6.01	6.96	6.49
	lower..	25	44	69	4.17	6.66	5.92
First molars.....	upper..	75	57	132	12.52	8.82	10.57
	lower..	55	77	132	9.18	11.65	10.42
Second molars.....	upper..	60	48	108	10.02	7.26	8.64
	lower..	73	79	152	12.19	11.96	12.07
Third molars.....	upper..	13	17	30	2.17	2.57	2.37
	lower..	31	28	59	5.17	4.24	4.70
Total.....		599	661	1,260			

SUMMARY.

	Number.	Per cent.
Upper.....	783	62.14
Lower.....	477	37.86
Total.....	1,260	
Right.....	599	47.63
Left.....	661	52.46
Total.....	1,260	

Summary of tables of susceptibility to dental caries in individual teeth of the United States Army as a whole.

Classification.		United States.		Philippine Islands.		Cuba and Porto Rico.		Total.	
		Caries.	Per cent.	Caries.	Per cent.	Caries.	Per cent.	Caries.	Per cent.
Central incisors.....	upper..	926	8.26	1,871	10.06	158	12.54	2,955	9.60
	lower..	46	.41	107	.58	8	.63	161	.62
Lateral incisors.....	upper..	796	7.09	1,500	8.05	128	10.18	2,423	7.79
	lower..	54	.48	112	.60	11	.87	177	.61
Cuspids.....	upper..	352	3.14	642	3.44	67	5.28	1,061	3.41
	lower..	73	.65	113	.61	10	.79	196	.63
First bicuspsids.....	upper..	828	7.39	1,493	8.01	78	6.78	2,399	7.71
	lower..	224	2.00	398	2.13	36	2.86	658	2.12
Second bicuspsids.....	upper..	977	8.72	1,611	8.65	82	6.49	2,670	8.58
	lower..	572	5.10	815	4.38	69	5.92	1,456	4.68
First molars.....	upper..	1,593	14.22	2,573	13.81	132	10.57	4,298	13.82
	lower..	1,350	12.05	2,184	11.73	132	10.42	3,666	11.79
Second molars.....	upper..	1,123	10.01	1,712	9.19	108	8.64	2,943	9.47
	lower..	1,410	12.58	2,181	11.71	152	12.07	3,743	12.04
Third molars.....	upper..	359	3.20	493	2.65	30	2.37	882	2.84
	lower..	524	4.67	821	4.40	59	4.70	1,404	4.58
Total.....		11,206		18,626		1,260		31,092	

SUMMARY.

	Number.	Per cent.
Upper.....	19,681	63.14
Lower.....	11,461	36.87
Total.....	31,092	
Right.....	15,282	49.15
Left.....	15,810	50.85
Total.....	31,092	

A reference to these tables will show the percentage of caries for the superior central and lateral incisors, taking the Army as a whole, to be 6 per cent higher than is usually given in published statistics, while for the inferior central and lateral incisors it is practically the same. For the superior cuspids it is 1 per cent higher, and for the inferior it is 0.15 per cent higher. The percentage for the superior first bicuspid is almost identically the same, while for the inferior it is 1.50 per cent higher. For the superior second bicuspid the percentage closely agrees with the published statistics, while for the inferior it is 0.90 per cent less. In the superior first molars it is 3.58 per cent less, while for the inferior it is 6.91 per cent less. The percentage for the superior second molars is 1.43 higher, and for the inferior 0.43 per cent higher. For the superior third molars it is 1.54 per cent less, while for the inferior it is 0.13 per cent higher. The lower percentage of caries for the superior and inferior first molars is due to the fact that these teeth as a rule decay early and are frequently lost before the individual reaches the age of puberty. The smaller per cent of caries of the inferior second bicuspid may be accounted for by the fact that these teeth are very susceptible to caries and are often lost before the individual reaches the legal age for enlistment, while the smaller per cent of caries of the superior third molars is due to the fact that these teeth are very irregular in the period of their eruption and sometimes fail to erupt at all.

The following table shows the difference in the susceptibility to dental caries in individual teeth as compared with the table published in the report covering 1901. These differences are due, no doubt, to the larger number of cases forming the basis upon which the statistics are computed, and are therefore more nearly correct. The whole number of cases of dental caries treated during the year ending December 31, 1901, was 8,408, while for the year ending December 31, 1902, it was 31,092. It is an interesting fact that dental caries is distinctly more prevalent upon the left side of the mouth than upon the right side.

Table showing difference in percentages of susceptibility to dental caries of individual teeth of the United States Army, as a whole, for the years 1901 and 1902.

Classification.		Report for the year 1901.		Report for the year 1902.		Difference in percent- age, 1902.
		Caries.	Percent- age.	Caries.	Percent- age.	
Central incisors	upper..	649	7.71	2,955	9.50	+1.79
	lower..	153	1.81	161	.52	-1.29
Lateral incisors	upper..	505	6.00	2,423	7.79	+1.19
	lower..	132	1.56	177	.51	-1.06
Cuspids	upper..	294	3.49	1,061	3.41	-.08
	lower..	146	1.73	196	.63	-1.10
First bicuspid	upper..	600	7.13	2,399	7.71	+.58
	lower..	175	2.08	658	2.12	+.04
Second bicuspid	upper..	679	8.07	2,670	8.58	+.51
	lower..	387	4.60	1,456	4.68	+.08
First molars	upper..	1,119	13.30	4,298	13.82	+.52
	lower..	1,194	14.20	3,666	11.79	-2.41
Second molars	upper..	802	9.53	2,943	9.47	-.06
	lower..	878	10.44	3,743	12.04	+1.60
Third molars	upper..	222	2.64	882	2.84	+.20
	lower..	473	5.60	1,404	4.53	-1.07
Total		8,408		31,092		

Table showing difference in percentages of susceptibility to dental caries of individual teeth of the United States Army, as a whole, for the years 1901 and 1902—Continued.

SUMMARY.

Classification.	Report for the year 1901.		Report for the year 1902.		Differences in percent-age, 1902.
	Caries.	Percent-age.	Caries.	Percent-age.	
Upper	4,870	57.92	19,631	63.14	+5.22
Lower	3,538	48.08	11,461	36.87	-6.21
Total	8,408	.....	31,092	.....	.....
Right.....	4,806	51.21	15,282	49.15	-2.06
Left	4,102	48.78	15,810	50.85	+2.07
Total	8,408	.....	31,092	.....	.....

The foregoing interesting tabulations, with professional comments, have been ably prepared for this report by Dr. John S. Marshall, contract examining and supervising dental surgeon, U. S. Army. The work of the contract dental surgeons has been of a high order and deserves commendation. Reports from experienced officers of the Army indicate that appreciation of the faithful and efficient services of the army dentist is steadily growing among officers and men.

The average number of enlisted men detailed from the Hospital Corps as "dentists' assistants" and "clerks" for the year January 1, 1902, to December 31, 1902, inclusive, was 36. These men deserve mention, for without the valuable assistance they were able to perform, after they had been trained in their new duties, the great amount of service that has been rendered by the dental surgeons could not have been accomplished.

HOSPITAL CORPS.

At the date of last report, June 30, 1902, the strength of the Hospital Corps was as follows:

Hospital stewards	271
Acting hospital stewards	405
Privates	3,366

Since then it has gained:

By enlistment	636
By transfer	302
Return from desertion	15

And lost during the same period:

By discharge by expiration of service	1,522
By discharge by order	139
By discharge by sentence of general court-martial	35
By discharge on surgeon's certificate	68
By retransfer to line	19
By retirement	7
By death due to disease	42
By death due to suicide	4
By death due to wounds	1
By death due to drowning	2
By desertion	124

Leaving in service June 30, 1903:

Sergeants first class.....	279
Sergeants.....	313
Corporals.....	10
Privates, first class.....	1,868
Privates.....	762

A most important advance in the interest of the corps was made by the proviso in the act making appropriation for the Army for the fiscal year 1904, directing changes in grades and pay, creating the grade of corporal, and authorizing the Secretary of War to organize companies of instruction, ambulance companies, field hospitals, and other detachments of the Hospital Corps, as the necessities of the service may require.

This act abolished the obsolete titles of hospital steward and acting hospital steward, which had no analogy with the titles of noncommissioned officers in other branches of the service, and substituted therefor the grades of sergeant first class, and sergeant; created the grade of corporal for certain members of the corps who may have an aptitude for controlling men, but do not possess the technical education to pass the rigid examination required for promotion to the grade of sergeant; divided the privates into two classes, and rated their pay at \$18 and \$16 per month, respectively.

Sergeants first class.—At the date of last report 29 vacancies existed in the grade of hospital steward. These vacancies were filled September 1, 1902, from the acting hospital stewards securing the highest marks in a competitive examination held in May, 1902.

During the year 25 vacancies have occurred among the sergeants first class, as follows:

Discharge by expiration of service.....	9
Discharge by favor.....	3
Discharge by order.....	2
Discharge by sentence of general court-martial.....	2
Died.....	2
Suicide.....	2
Retired.....	3
Deserted.....	2

From May 4 to 9 of this year a competitive examination was held to fill these vacancies. Sixty-nine sergeants in the United States applied for authority to appear for examination. Of this number 4 withdrew before examination, 17 were not recommended by the examining board, 5 applications were disapproved, 4 were absent from their post, 1 was sick, 1 declined the examination, and 1 deserted. In the Division of the Philippines 24 sergeants applied for examination. Of these 23 were approved, 1 was disapproved, 7 withdrew prior to and 1 during the examination. Of the 14 who completed the examination 12 were recommended by the local board for promotion.

During the year 126 privates were appointed sergeants. Of this number 7 were appointed by the Surgeon-General and 119 by chief surgeons of departments.

The papers presented by the men examined for appointment to the grades of sergeant first-class and sergeant show that the high standard required from this very excellent class of men is being maintained.

Ten corporals have been appointed at posts within the United States. Six appointments were allowed to the Division of the Philippines.

Thirty-five lance corporals were also appointed by chief surgeons of military departments within the United States.

Recruitment.—Owing to the reduction it was necessary to make in the Hospital Corps during the year, active recruitment was suspended early in December, 1902, and reenlistments restricted to men who had excellent discharges or possessed some special qualifications. As it was evident these instructions would reduce the corps by June 30 to about the maximum strength allowed by the Secretary of War, a request was made to the Adjutant-General on June 27 that recruiting officers be notified that it was desired to resume recruiting for the corps, and also be requested to submit the names of desirable men to this office for authority to enlist them.

The reduction of our forces in the Philippines left a surplus of Hospital Corps men in those islands. To reduce this number to the allowance for troops serving in the tropics, viz, 5 per cent for American troops and 3 per cent for native scouts, further transfer of privates to that division was suspended in October, 1902. On June 27 a communication was received from the Chief Surgeon, Division of the Philippines, stating that the strength of the corps in that division had been reduced to the allowance quoted above. A request was therefore made that the Commanding General, Department of California, be directed to send 25 privates, Hospital Corps, to the Philippines on the transport sailing from San Francisco on July 1.

The distribution of the Hospital Corps at the date of this report is as follows:

Department.	Sergeants first class.	Sergeants.	Corporals.	Privates first class and privates.	Total.
California	11	17	.....	105	133
Colorado	11	10	.....	75	96
Columbia	15	10	.....	105	130
Dakota	8	10	.....	75	93
East	45	50	.....	400	495
Lakes	5	13	.....	84	102
Missouri	12	24	.....	166	202
Texas	4	11	1	58	74
Independent	41	67	9	438	605
Total in United States.....	152	212	10	1,556	1,930
Cuba	3	6	.....	28	37
Porto Rico.....	2	4	.....	26	32
Hawaii	1	2	.....	12	15
China	1	.....	.....	5	6
Philippines	115	86	.....	780	981
Transports	5	3	.....	23	31
Total	279	313	10	2,430	3,082

Two companies of instruction for Hospital Corps men have been in operation during the present year, one at Washington Barracks and one at Angel Island. It is my desire and intention that newly enlisted men shall be sent to these schools for a four months course of instruction. Up to the present time it has not been possible to carry out this scheme in all cases. In the early part of the year the demand in the Philippines made it necessary to send men to that division before they had completed their course of instruction, and after December, when active recruiting was suspended, it was not practicable to furnish the men required by the schools. It is hoped that these difficulties can be avoided in future.

A board of medical officers was convened in Washington per paragraph 23, Special Orders 104, current series, Adjutant-General's Office, to decide upon a uniform system of instruction for the companies and for detachments of the corps throughout the Army; also to revise the drill regulations. The board rendered its report June 27, and has recommended a very complete scheme of instruction for both detachments and companies, which it is believed will prove satisfactory. The board also recommended some sweeping changes in the drill regulations of the Hospital Corps, which proposed regulations are now being printed and will be submitted to the Medical Corps for its opinion before receiving the approval of this office.

Company of Instruction No. 1, Hospital Corps, at Washington Barracks, D. C., has been of special value to the Medical Department, as it is used in connection with the General Hospital to instruct student officers at the Army Medical School in drill, first aid, field exercises, and administration. Capt. F. P. Reynolds, assistant surgeon, U. S. Army, commanding the company, reports as follows:

Besides the training of privates and noncommissioned officers, the work of the medical officers and noncommissioned officers of the company has chiefly been directed toward perfecting the organization and course of instruction. Under date of May 13, 1903, a complete outline of the company organization and course of instruction was submitted to the Surgeon-General, with the recommendation that it be submitted to the board of medical officers appointed by paragraph 23, Special Orders 104, current series, headquarters of the Army, to recommend a course of instruction for companies and to prepare a scheme of instruction for detachments.

The experience of this company has been that the permanent cadre of a company of instruction, as provided in paragraph 49, Manual for the Medical Department, 1902, is insufficient. For this reason, on October 21, 1902, authority was requested to maintain a larger permanent personnel than that prescribed. The regulation referred to allows 2 sergeants first class, 8 sergeants, and 6 privates as the permanent cadre, with permission to increase the number of noncommissioned officers as may be necessary. In the line of the Army, under its present organization, the number of noncommissioned officers per company are: 16 in the cavalry, 18 in the infantry, 20 in the engineers, 21 in the field artillery, and 22 in the coast artillery. It must be apparent that the proportion of noncommissioned officers in a company of instruction, which consists chiefly of recruits, should be at least as large as in a company of the line having a personnel which changes but little from month to month. With equal clearness it may be seen that a Hospital Corps company of instruction requires an additional complement of noncommissioned officers as instructors, of which companies of the line have no counterpart. To carry out the course of instruction and for other necessary duties, it is my belief that the permanent cadre of noncommissioned officers should be increased to 14, and that it would be advantageous to have 8 others who are to be considered as being under instruction in the noncommissioned officers' class. Besides constituting a reserve of noncommissioned officers available at all times for the needs of the service, the additional 8 noncommissioned officers under instruction would enable the company to be prepared at once to furnish the full number of noncommissioned officers and privates to man a field hospital or an ambulance company, as organized under present field regulations.

Twenty noncommissioned officers is not an excessive number for a company, as has been shown, and for a company of instruction of 100 to 150 men the number is, I believe, not beyond the needs of the organization if it is to be maintained at its highest efficiency.

The regulation allowance of 6 privates for permanent company duty is also insufficient. The duties attached to the positions which the permanent men must occupy are of such a nature that they can not satisfactorily be performed by recruits or by men temporarily detailed. It takes many months to learn these duties, and when the men become proficient it is manifestly advisable to retain them. Moreover, it is important that there be in a company of instruction a considerable number of men of some service and who are thoroughly trained and well disciplined.

The present organization of the company is as follows:

Officers:	
Captain, Medical Department	1
First lieutenant, Medical Department	1
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Noncommissioned officers:	
First sergeant	1
Quartermaster sergeant	1
Mess sergeant	1
Company clerk	1
Police and stable sergeant	1
Instructors and assistant instructors	9
<hr/>	
Total	14
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Privates on special duty, permanent cadre:	
Cooks	2
Kitchen police	2
Dining-room attendant	1
Property attendant	1
Ambulance driver	1
Night watchman	1
Clerks	2
Musicians	2
Artificer	1
<hr/>	
Total	13

In the absence of a definite curriculum, prescribed by the Surgeon-General, the course of instruction is as follows:

(1) Discipline and duties of a soldier; (2) bearer drill; (3) first aid; (4) field work; (5) care of animals; (6) anatomy and physiology; (7) cooking and diet cooking; (8) nursing; (9) materia medica and pharmacy; (10) clerical work. For non-commissioned officers, in addition to the above: (11) Elementary hygiene; (12) minor surgery; (13) Army Regulations; (14) mess management.

First month (daily, except Saturday and Sunday):

Anatomy and physiology.
Clerical work.
Bandaging.
Bearer drill.
Calisthenics and company drill.

Second month:

Clerical work.
First aid.
Care of animals.
Bearer drill.
Calisthenics and company drill.

Third month:

First aid.
Nursing.
Diet cooking.
Materia medica.
Bearer drill. Practical field work.
Calisthenics and company drill.

Fourth month:

Nursing.
Pharmacy.
Materia medica.
Field exercises.
Calisthenics and company drill.

Saturday:

Inspection. Duties of a soldier.
Articles of war. Company regulations.

Calisthenics are given in accordance with the United States Army Manual for Calisthenic Exercises.

This course has been based upon existing regulations which define the duties of the Hospital Corps in garrison and in the field. During the year there have been prepared and printed complete outlines of each course. These outlines have also been submitted to the Surgeon-General for his approval. There has also been prepared by the instructor in materia medica and pharmacy an outline and manual for instructors and classes in these subjects. In view of the immediate need of such an outline, it was on March 24, 1903, submitted to the Surgeon-General with the recommendation that it be published for the use of the Medical Department of the Army.

The need of a manual of Hospital Corps instruction is, I think, felt by all medical officers of the Army. The lack of such a manual has greatly interfered with the work of this company, and it was for this reason that definite and complete outlines of each course were prepared.

It is hardly reasonable to expect that a man on completing four months of instruction in a company is well instructed in all his duties. Many duties, such as nursing and dispensary work, require many months of practical training to reach proficiency. In other branches of the service a man is hardly out of the recruit class in four months and is not considered well instructed in less than a year. It is to be expected, however, that four months in a company should make an average recruit a soldier who has a knowledge of discipline and understands what is expected of him, and who is capable of performing with some degree of skill most of the duties of the Hospital Corps in garrison or in the field.

This company is of special importance to the Medical Department for the reason that it is available for the instruction of student officers in the Army Medical School, in field exercises, and in Hospital Corps administration, instruction, and discipline. It also provides opportunity to make practical tests of articles of field equipment, and is prepared to demonstrate at any time the organization and work of a field hospital or an ambulance company, having at hand the specified equipment and men trained in their duties. The company, therefore, can at once take the field, either as an ambulance company or a field hospital. The company has represented the Medical Department of the Army in numerous public ceremonies, which during the past two years have included the inauguration of President McKinley, his funeral ceremonies, ceremonies connected with the dedication of the Rochambeau monument and of the Army War College. Numerous public exhibitions have been given which have been largely attended and have excited considerable interest in Hospital Corps instruction and in the new field organization and equipment of the Medical Department. The company attended the encampment of the National Guard of Pennsylvania at Gettysburg, Pa., going and returning by marching, at which point it established a regimental hospital. At the Army maneuvers at Fort Riley, Kans., during the past autumn, the company organized and largely manned both Field Hospital No. 3 and Ambulance Company No. 3. It also manned the field hospital provided for the use of the Grand Army of the Republic at its recent encampment in this city.

Company of Instruction No. 2, Hospital Corps, at Fort McDowell, Angel Island, Cal., has, besides its regular work of instruction, the care of all casual members of the Hospital Corps awaiting transportation to the Pacific islands or assignment to station on return therefrom.

The discipline, management, and instruction of this company have been worthy of high praise. A report descriptive of the organization and its method was contributed by the company commander, Capt. John S. Kulp, assistant surgeon, U. S. Army, from which the following is taken:

' A receiving and distributing depot for the Hospital Corps, denominated the "School of Instruction," had existed at Fort McDowell since September 8, 1899, and at the time of my arrival, on March 19, 1902, had 1 steward, 1 acting steward, and 55 privates. The instruction consisted of thirty minutes setting-up drill, one hour study, one hour either litter drill or diet cooking, one lecture, and one hour of bandaging for five days of each week.

The objects in view in organizing a company from this school were to build up a permanent military organization on a strong official footing which should (a) furnish at regular intervals a definite number of instructed men, (b) provide candidates for vacancies in the noncommissioned grades, and (c) shelter and instruct a varying number of casuals. In furtherance of this idea a temporary course of instruction of one month's duration was put into operation while building up a permanent cadre and instructing its personnel in their duties. With the approval and assistance of the chief surgeon (now Surgeon-General) a number of noncommissioned officers and

privates were brought together and given specific minutely outlined duties. A non-commissioned officers' school was organized, and a company council met regularly to consider ways and means to insure progress and improvement. The ideal in mind has been to cause the certificate of qualification to signify that its holder is an instructed sanitary soldier, ready to fill any ordinary position in hospital or field, and for this reason the course is practical, rather than theoretical, and attention is invited to the nursing, cooking, first aid, and field work in this connection. The situation of the company is on an island with an ideal climate, where it is brought into constant competition with other military organizations and yet is independent of a general hospital.

Paragraph 49, Manual for the Medical Department, 1902, gave the first competent authority for the organization, and this was afterwards confirmed by direct authority of the Secretary of War, dated November 8, 1902, and still later by act of Congress, March 2, 1903.

The company organization is 1 captain, 1 lieutenant, 1 first sergeant, 4 class officers, 3 noncommissioned instructors, 1 drill sergeant, 1 quartermaster-sergeant, 1 chief clerk, 2 clerks, 2 cooks, 1 carpenter, 1 messenger, 1 ambulance driver, and 4 police. In addition to the four classes there are two casual squads, and the average personnel is 120. During the last year 985 men have been on duty with the company. The duties of the permanent cadre are:

Company commander, also instructor in hygiene.

First lieutenant, also instructor in first aid, ward work, and minor surgery.

First sergeant, instructor in regulations, discipline, and soldierly efficiency; responsible for the appearance of the personnel, buildings, and grounds, for the prompt rendition of official reports, for the company fund, and for the duty roster.

Quartermaster-sergeant, in charge of property and property papers; in charge of mess.

Chief clerk, general supervision of all papers (except those relating to property), preparation of data for reports, personally checks and mails reports, instructor in clerical work.

First duty sergeant, in charge of second-class field hospital camp, of drill (ambulance, infantry, litter, setting-up, and tent), instructor in theoretical first aid.

Second duty sergeant, assistant instructor in practical field work and drills; in charge of casualls.

Third duty sergeant, instructor in management and care of animals; in charge of quarters.

Fourth duty sergeant, class officer of the first class; instructor in bandaging and ward management.

Fifth duty sergeant, class officer of the second class; second in command of field hospital; instructor in pharmacy.

Sixth duty sergeant, class officer of the third class; instructor in materia medica.

Seventh duty sergeant, class officer of the fourth class; instructor in elementary anatomy and physiology.

First clerk, descriptive book, descriptive lists, information slips, copy of muster roll, return of the personnel, pay rolls, general typewriting, and other office work.

Second clerk, letters received, letters sent, clothing book and schedules, sick report, copy of muster roll and return of personnel, and general office work.

Female nurse, instructor in nursing and diet cooking.

The general scheme of instruction is a four months course with eight hours of daily work. The end in view is to produce good all-round men for the service of post hospitals and to have them so thoroughly grounded in their military duties that in case of war each graduate could perform efficient service as a noncommissioned officer. Many of them become noncommissioned officers as soon as an opportunity presents itself, for the final examinations are rather more difficult than are those usually given for the grade of sergeant. Beyond all else it is recognized that these men are not embryo doctors, medical students, nor "soldier boys," but enlisted men whose duty in time of peace is hardly less important than during actual war, and only men of excellent character are selected for the classes. The earnestness and rivalry which exists, not only among the pupils, but among the instructors themselves, is most gratifying, and it is believed that every man who has received the certificate of graduation is at least well started toward a knowledge of the multifarious duties of the sanitary soldier, besides which his experience has not been gained at the expense of the sick in hospital.

The course itself may be briefly outlined as follows:

Practical courses.—(a) Field work: At the end of the third month the second class goes into camp for a week as a field hospital subpost. The island affords numerous suitable positions which are but a few miles from the post, and which in this climate

are comparatively comfortable throughout the year. During this week the class receives practical instruction in camp sanitation, with especial reference to the development and protection of water supplies, the making and disinfection of sinks, the protection from flies and mosquitoes, the care and use of field-hospital property, camp cooking, drainage, and disposal of waste, and the administration of field wards.

(b) Practical first aid: This is taught at almost every drill, and the handling of supposititious patients is introduced whenever possible. Temporary dressing and ambulance stations are frequently made.

(c) A good road encircles the island, and the classes are sent out for practice marches at least once a week.

(d) Care of animals: A new barn is under construction, and it is hoped that the Quartermaster's Department can be induced to furnish horses for the exclusive use of the company. The fourth class now receives daily instruction in grooming, saddling, harnessing, and the care of ambulances and wagons at the quartermaster stables. At the dairy barn at the post hospital each member of this class is taught feeding, milking, and the care of cows and poultry.

(e) Elementary materia medica: Especial reference is given to the handling, weighing, and measuring of drugs so as to acquire a knowledge of their general gross appearance. (Forty hours.)

(f) Elementary pharmacy: The actual processes are carried on by each member of the class and are repeated until he shows proficiency. The underlying principle is that it is better for a man to know how to make a seidlitz powder than to tell how to make it.

(g) Bandaging (forty hours): Actual practice with systematically graded course.

(h) Dictation: Many intelligent men have never received instruction in penmanship. In the fourth class ten hours are devoted to this subject, and such men as are unable to profit by it are weeded out. Later in the course (ten hours in the second class) the preparation of papers is taught to such as show an aptitude for clerical work.

(i) Drill—ambulance, litter, foot, setting-up, and tent: Sixty hours are devoted to these subjects, and in addition the company takes part in the evening parade on five days of the week. The march in review has an excellent effect on the morale of the organization, as it allows comparison and brings it into competition with both the infantry and artillery.

(j) Diet cooking: Sixteen hours for each section of four men. In this course the idea is to teach each man to prepare about a dozen simple palatable dishes (using the components of the ration to a large extent) rather than to become a cook. The men not only individually prepare the food, but individually eat what they have prepared.

(k) Practical nursing and ward management: Ward classes of four men each at the post hospital receive thirty hours each in the last month of the course. The instruction is as clinical as it can be made, taking the cases from their admission at sick call until their discharge from hospital. The class assists at minor operations, makes dressings, administers medicines, handles ward property, and especial attention is given to the instruction concerning the thermometer, hypodermic syringe, and baths.

Theoretical courses.—(a) Elementary anatomy and physiology: Forty hours in the third and fourth classes.

(b) Regulations: Ten hours in the fourth class. A portion of the Articles of War are read after each Saturday inspection.

(c) Nursing: Thirty-five hours in the second and third classes.

(d) First aid, recitations: Ten hours in the first class.

(e) Hygiene: Eight hours in the first class.

(f) Military duties of the sanitary soldier: Eight hours in the first class.

The daily routine may be briefly tabulated as follows:

Hour.	Fourth class.	Third class.	Second class.	First class.
6 to 6.20.....	Setting-up drill.....	Setting-up drill.....	Setting-up drill...	Setting-up drill.
7 to 8.....	Stables.....	.....	.....	Ward class.
8 to 9.....	Study.....	Study.....	Pharmacy.....	Pharmacy.
9 to 10.....	Drill.....	Drill.....	Drill.....	Ward class.
10 to 11.....	Elementary anatomy	Elementary anatomy	Clerical work.....	Minor surgery.
11 to 12.....	Dictation, first aid.....	Materia medica.....	Materia medica.....	First aid.
2 to 3.....	Bandaging.....	Bandaging.....	Diet cooking.....	Diet cooking; hygiene.
3 to 4.....	Regulations.....	Nursing.....	Nursing.....	Ward management; military efficiency.
4 to 5.....	Study.....	Study.....	Diet cooking.....	Diet cooking.

In addition to the four regular classes under instruction there is usually a number of men casually at the company. This is composed of those awaiting assignment to station, en route to or recently returned from the colonies, about to be discharged, or sent here for discipline. The latter class, although rather numerous, gives but little trouble. If the man appears incorrigible, he is discharged without honor; otherwise, if still of value to the service, he is given a chance to reform, and a considerable percentage turns out fairly well. If hopelessly inefficient and yet of good character, his honorable discharge is requested for the good of the service. The ignorance of some noncommissioned officers and men of long service is simply phenomenal and forms the strongest argument for sending all recruits to one of the companies. Recruits undoubtedly furnish the best class of men for instruction, and even those transferred at posts to fill existing vacancies could receive better training in companies than in the ordinary detachment.

The personnel under instruction in the classes has been of fairly constant quality. Four months (one-ninth of an entire enlistment) is considered too long a time to devote to any but the better class of men. Previous experience has taught the unwisdom of allowing detachment commanders to recommend men under their command, and the larger sources of supply have been recent reenlistments and recruits. Of the two, as has been said, the recruit is the more desirable and gives better results, as little can be done with the older men. Men of bad character and intemperate habits have not been placed in the regular classes, and 24 have been discharged without honor.

In these companies the permanent cadre is practically the organization itself, and in this one the allowance is rather meager. There is no apparent necessity why the surgeon of the post should be connected with the company, but if considered advisable to continue one officer in the dual role there should be two junior officers instead of one, as the conduct of the medical department of a four-company post, if properly done, requires the entire time of one officer. The time of the men under instruction is so fully taken up that the ordinary post fatigue, kitchen police, and other details are best performed by casuals or permanently attached privates, and it is found that eight hours practical and theoretical work a day is all that can be given with advantage to men so unused to sustained mental effort.

The noncommissioned officers having once qualified as instructors, become more and more valuable with every recitation they conduct, and their tenure of office should be indefinite. An everlasting change of personnel robs the company of "a character of fixity, that true sign of the law," and seriously lowers the quality of its results. Among other things, a modern barracks is sorely needed, as the one now occupied is more interesting to the antiquarian than to those who must, perforce, inhabit it.

Customs, traditions, and an esprit de corps are being formed, the organization takes the same part in the life of the post as other companies, and every month shows both progress and improvement.

In closing this report no truer remark can be made than that of the Surgeon-General, who, in his annual report of ten years since, said: "It would seem, therefore, that no more important duty now attaches to the Medical Department of the Army than the proper training of the men of the Hospital Corps and the perfecting of its organization."

ARMY NURSE CORPS.

At the close of the fiscal year 1902 there were 118 nurses in the service. During the fiscal year 1902-3 there have been 35 appointments and 54 discharges, leaving 99 nurses on the active list June 30, 1903, distributed as follows: United States Army General Hospital, Presidio of San Francisco, Cal., 40; United States General Hospital, Fort Bayard, N. Mex., 12; Hospital Corps Company of Instruction, Fort McDowell, Cal., 1 dietist; First Reserve Hospital, Manila, P. I., 31; Convalescent Hospital, Corregidor Island, P. I., 6; Base Hospital, Iloilo, P. I., 6; at home awaiting discharge, 2; en route to the Philippine Islands, 1.

Last year nurses were serving at eight of the United States Army hospitals, this year at only six—three in the United States and three in the Division of the Philippines. The withdrawal of the greater part

of the troops from Calamba and Dagupan, Luzon, P. I., reduced the number of patients at these places so much that the services of trained nurses were no longer required.

The health of the corps has been excellent. There has been but one death among those on the active list since 1899; none since the last report.

The work of the corps as a body deserves high commendation. It has been faithfully and intelligently done, and the individual members have shown themselves zealous and readily amenable to the rigid discipline of our military hospitals.

MEDICAL AND HOSPITAL SUPPLIES.

Several important questions having to do with the equipment of the Medical Department have received appropriate action during the current year.

The supply of surgical instruments and appliances at posts, representing the purchases of forty years, had become so heterogeneous in character and many of them so unsuited to the requirements of modern aseptic surgery that it was felt the time had arrived to replace them by a modern and uniform equipment. Instructions were, therefore, given through the chief surgeons for the condemnation of all instruments carried in the Manual for the Medical Department as obsolete, except such cases as could be remodeled to conform with the supply table without prohibitory expense.

Steps had been already taken toward the accumulation of an adequate reserve of field medical equipment for war. This most necessary provision has been energetically prosecuted during the year, and the department has now on hand or under contract a complete field equipment for both field and regimental hospitals of five army corps, except the articles furnished by the Quartermaster's Department. A moderate surplus has been also provided to meet the requisitions for the National Guard made by the governors of States under the act for the equipment of the militia approved March 2, 1903.

Steps have been taken to carry into operation the scheme of containers for medicines invented by Capt. Edward L. Munson, assistant surgeon, U. S. Army, and adopted in the Supply Table, 1902, which provides that all bottles shall bear a definite relation, as regards cubic space occupied, to the standard unit liter bottle, so that two, four, eight, or thirty-two of the smaller sizes or various combinations of these sizes may be packed in the same space as the 1-liter bottle. All bottles are packed in corrugated cardboard cartons, the thickness varying with the size of the bottles. The 1-liter bottle in its carton constitutes the packing unit, measuring 7 by 5 by 5 inches, and all combinations of smaller bottles when packed have the same dimensions. No other packing material except the cartons is needed.

The dimensions proposed for packages of medicines prepared for shipment are: For railroad and wagon transportation, 35 by 15 by 14 inches, inside measure; for pack-mule transportation, 28 by 15 by 15 inches, inside measure. These packages will receive 48 and 36 packing units, respectively, and will weigh approximately 105 and 90 pounds.

RECRUITING.

In 1902 a total number of 45,218 white and colored candidates was examined for enlistment, of whom 30,176 were accepted, or almost exactly two-thirds of the number applying. Of 42,183 white men 27,790 were accepted, and of 3,035 colored men 2,386 were accepted.

Monthly reports of examinations of recruits from the Philippine Islands, as far as received, show that in 1902, 736 native Malays were examined for the companies of Philippine Scouts and that only 20 were rejected.

Eighteen American Indians were also examined, of whom 14 were enlisted as scouts.

Of every thousand accepted men 781.05 were born in the United States, 64.76 in British territory, 42.25 in Germany, and 8.79 in Norway and Sweden.

As usual, the greatest number of rejections were for defects of physique, while diseases of the eye, diseases of the genito-urinary system venereal diseases, and hernia caused the next largest percentage of rejections in the order named.

Number of white and colored applicants for enlistment examined physically during the year 1902, with the number accepted, rejected on primary examination, and declined, with ratios per thousand.

	White.		Colored.		Total.	
	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.
Examined	42,183	1,000.00	3,035	1,000.00	45,218	1,000.00
Accepted	27,790	658.80	2,386	786.16	30,176	667.34
Rejected	10,805	256.14	523	172.32	11,328	250.52
Declined	3,588	85.06	126	41.62	3,714	82.14

Nativity of white and colored recruits accepted during the year 1902, with ratios per thousand.

Nativity.	White.		Colored.		Total.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
United States	23,569	781.05	2,372	78.61	25,941	859.66
England	428	14.18	2	.07	430	14.25
Scotland	104	3.45			104	3.45
Wales	17	.56			17	.56
Ireland	1,081	34.17			1,081	34.17
Canada	311	10.31	1	.03	312	10.34
Other British	63	2.09	8	.26	71	2.35
France	36	1.19			36	1.19
Belgium	17	.56			17	.56
Holland	21	.70			21	.70
Denmark	112	3.71			112	3.71
Norway	83	2.76			83	2.76
Sweden	182	6.08			182	6.08
Germany	1,275	42.25			1,275	42.25
Switzerland	74	2.45			74	2.45
Austria	138	4.57			138	4.57
Bohemia	30	.99			30	.99
Hungary	22	.73			22	.73
Poland	25	.83			25	.83
Russia	137	4.54			137	4.54
Finland	12	.40			12	.40
Italy	46	1.52			46	1.52
Others	57	1.89	8	.10	60	1.99
Total foreign	4,221	139.88	14	.46	4,235	140.34
Grand total	27,790	920.93	2,386	79.07	30,176	1,000.00

Causes of rejection among 45,218 candidates for enlistment examined during the year 1902, with ratios per thousand.

Number examined	White, 42,188.		Colored, 3,035.		Total, 45,218.	
Causes of rejection.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.
Venereal diseases.....	910	21.57	105	34.60	1,015	22.45
Other infectious diseases	130	3.08	6	1.98	136	3.01
Diseases of nutrition, general	52	1.23	3	.99	55	1.22
Diseases of the nervous system	77	1.83	3	.99	80	1.77
Diseases of the digestive system	806	19.10	26	8.57	832	18.40
Diseases of the circulatory system	1,314	31.15	48	15.82	1,362	30.12
Diseases of the respiratory organs	133	8.15	2	.66	135	2.99
Diseases of the genito-urinary system	1,014	24.04	29	9.55	1,043	23.07
Diseases of the lymphatic system and ductless glands	63	1.49	10	3.29	73	1.61
Diseases of the muscles, bones, and joints.	123	2.92	3	.99	126	2.79
Diseases of the integument and subcutaneous connective tissue	228	5.41	13	4.28	241	5.33
Diseases of the eye	1,414	33.52	55	18.12	1,469	32.49
Diseases of the ear	145	3.44	7	2.30	152	3.36
Diseases of the nose	20	.47	2	.66	22	.49
Hernia	465	11.02	25	8.24	490	10.84
Other injuries	85	2.01	4	1.32	89	1.97
Overheight	2	.05			2	.04
Underheight	40	.95	3	.99	43	.95
Overweight and obesity	16	.38	2	.66	18	.40
Underweight	485	11.50	9	2.96	494	10.92
Imperfect physique	1,620	38.40	58	19.11	1,678	37.11
Mental insufficiency	30	.72			30	.66
Over age	10	.24	1	.33	11	.24
Minor	469	11.12	8	2.64	477	10.55
Married or having dependent relatives	106	2.51	3	.99	109	2.41
Illiteracy	31	.73	4	1.32	35	.77
Imperfect knowledge of English	23	.54			23	.51
Reenlistment disapproved for various reasons	37	.88	3	.99	40	.88
Character, bad or doubtful	115	2.73	10	3.29	125	2.76
Reference, none or unsatisfactory	24	.57			24	.53
Aliens	6	.14			6	.13
General unfitness and undesirable	512	12.14	17	5.60	529	11.70
No vacancies	5	.12	4	1.32	9	.20
Unclassified	295	6.99	60	19.77	355	7.85
Total	10,805	256.14	523	172.32	11,328	250.52

IDENTIFICATION OF DESERTERS AND OTHER UNDESIRABLE MEN.

Up to the end of June, 1903, 3,028 cases of identity have been reported to the Adjutant-General, U. S. Army. Of the total number there have been 32 failures to identify, either from lack of sufficient evidence or on account of the death, escape, or desertion of the individual before the case could be thoroughly investigated.

Of the 2,533 cases of identification up to the end of 1901, 656 men were held to service, 1,130 were dishonorably discharged, 469 deserted, and 278 were reported for the information of the Adjutant-General, the men being out of service at date of report.

During the last half of the fiscal year the identification section has furnished to the Pension Bureau a great amount of evidence from the outline cards and examination forms of recruits. From January to June, inclusive, 5,674 calls for such evidence from the Commissioner of Pensions were answered. I understand that the information furnished as to defects recorded at enlistment has materially assisted in the prompt settlement of many pension claims without the expense of special examinations, and has therefore saved the United States a considerable amount of money.

HEALTH OF THE ARMY.

The admission rate per thousand of strength of the whole Army for disease and injury in 1902 was 1,716.51, a slight improvement upon the rate of 1901, which was 1,791.59. Discharges for disability gave a rate of 23.32, considerably larger than in the foregoing year, in which 19.95 discharges per thousand were reported. Deaths in 1902 caused a loss of 15.49 men for each thousand of strength, a rate decidedly ahead of that for 1901, which was 13.94, but 3.54 per thousand died of cholera, and excluding these the death rate for 1902 would have shown improvement over the previous year.

In the United States the admissions were 1,843.77 and deaths 7.83 per thousand, compared with 1,550.25 and 6.90 in 1901.

In the Pacific islands 2,144.75 admissions and 24.31 deaths per thousand compare very unfavorably with 1,928.14 and 17.96 in 1901, but cholera caused the death of 7.57 soldiers out of every thousand in the islands.

In Cuba and Porto Rico the army had much less sickness and death than in the United States or Pacific islands, the admission rate there of 1,300.24 and a death rate of only 6.72 show that our troops on these islands are as healthy as was the whole army at home during the decade 1888-1897 prior to the Spanish war, when sickness and mortality were the lowest ever recorded.

The greatest noneffectiveness from disease and injury in the United States was reported in January, February, and March, in which months the sick report of troops at home was larger than in the Pacific islands. In March the cholera epidemic began in Manila and the island rates began at once to increase, the greatest number of admissions and the highest monthly mortality being reported in July.

A great reduction in the number of military posts in the Philippine Islands has taken place and from many of the more inaccessible stations troops have been withdrawn. The present force is therefore distributed so as to allow the best possible sanitary conditions to obtain. Until barracks are constructed for the permanent garrisons the troops are exposed unavoidably to the insanitary surroundings of native towns, and while it is believed that under existing circumstances their health is as good as can be expected, the gradual withdrawal of the troops into well-built barracks on new ground and away from the unwholesome influences of too close contact with the native population should be followed by improvement in the rates of sickness and mortality. There is, however, much improvement in the sanitary conditions of cities and towns, notably in the case of Manila. Under the insular board of health, the chief officer of which has always been a medical officer of the Army, the city's health now compares favorably with some of the largest municipalities in the United States and Europe not usually considered as particularly unhealthful. From a report received from the commissioner of public health, Maj. E. C. Carter, surgeon, U. S. Army, dated May 12, 1903, it appears that the death rate in Manila for the current year is about one-half of what it was four years ago, amounting to only 22.17 per thousand for all classes.

The food supply of the troops abroad is reported as generally excellent. Fresh meat and vegetables are supplied plentifully, and ice is furnished at nearly all the island stations.

There is a general recommendation noted in nearly all the sanitary reports, from commands of Philippine scouts, made by medical officers, and strongly urged by company commanders that the full army ration be issued to these soldiers. As diet is supposed to have much to do with the prevalence of beri-beri, it would appear that these recommendations deserve careful consideration.

The custom of boiling all drinking water in the Philippine Islands is kept up, and there appears to be a loss of confidence in the Waterhouse-Forbes sterilizer, with much difference of opinion as to its merits. It is hoped that a series of experiments, made on the spot, may demonstrate the exact value of the apparatus of which so much was expected.

Modern systems of drainage and sewerage being practically nonexistent in the Philippines, much attention is given to complete removal of all wastes by manual labor and cartage.

Criticism of the clothing for hygienic reasons is scarcely ever noted in sanitary reports either at home or in the tropics.

In the United States at some stations the barracks and quarters are reported as being overcrowded, with resulting bad ventilation, or else in bad repair. This is a natural result of the increase of the Army at home stations more rapidly than new buildings could be constructed, and will be remedied in time.

The water supply of posts in the United States is generally satisfactory and beyond criticism, but at some of the larger stations water for drinking is boiled as a routine measure. The necessity for such action at home, where good natural water can generally be obtained, is much to be deplored. The permanent military stations of the United States should have water supplies beyond suspicion, ample for all purposes, and preferably independent of neighboring municipalities. To furnish, with much trouble, a limited supply of boiled or distilled water for drinking where impure water, or at least water under suspicion, is used for other purposes, is very unsatisfactory, as most men will drink from the most convenient source, and are apt to prefer the unboiled water. At Fort Leavenworth, Kans., the water supply from the town system of Leavenworth has been repeatedly condemned by medical officers, but the question seems to be now on the eve of satisfactory settlement. At Jefferson Barracks, Mo., an experimental well has been suggested, with a view to securing a water supply independent of St. Louis. At the Presidio of San Francisco, Cal., the local supply is insufficient, and the general hospital and neighboring camps and cantonments use the city water.

Sewerage and disposal of wastes generally are reported satisfactory, although at Jackson Barracks, La., the problem of sewage disposal is as yet unsettled, and at Fort Ringgold, Tex., a large and offensive cesspool has existed, due to the fact that the outfall of the post sewer was left high and dry several years ago when the Rio Grande changed its course.

The food of the Army in the United States is almost always reported as very good. Adverse criticism is exceedingly rare, being even then generally directed toward minor defects in baking, cooking, or serving, rather than the quality of the raw material.

It is believed that the sanitary inspections of military posts required of the senior medical officers on duty are conscientiously carried out, and that all defects that can be remedied by local action receive prompt consideration, while recommendations involving new construction or

large expense are brought before higher authority. Inspections of all the posts of the military department by the chief surgeon have been authorized in some cases. The value of such inspection is self-evident; first, as it affords the chief medical officer a necessary acquaintance with the personnel of medical officers and enlisted men of the Hospital Corps, and the methods of instruction, administration, and care of sick employed at each post; and, second, it enables him to know personally the sanitary conditions affecting all troops in the department. I earnestly repeat the recommendation of my predecessors that each chief surgeon of a department be required annually to inspect the medical department and the sanitary condition of every post. Both the knowledge and experience of a trained medical officer are necessary to an inspector reporting upon such matters as the care of the sick, the management of contagious diseases, professional instruction of enlisted men, etc., while the chief surgeon who does not thoroughly know the sanitary conditions of the department can not be expected to intelligently act upon numerous questions referred to him for opinion or decision.

The work of the sanitary inspector attached to the headquarters Division of the Philippines has consisted in supervising the sanitary care of Government storehouses, distilling plants, inter-island transports, and the lorchas, bancas, and barges of the Army Transport Service.

Until recently the quartermaster and commissary storehouses were in various parts of the city of Manila, necessitating a loss of much time in travel from place to place for inspecting purposes. These buildings were large and airy, making good storehouses, but they were poorly provided with water-closets, and the inspector found difficulty in preventing the native employees from committing nuisances about the alleys and grounds in their neighborhood. But the concentration of all warehouses on the south bank of the Pasig River, where efficient sanitary closets have been provided, has obviated the difficulties encountered in this direction.

The two distilling plants at Manila furnish about 10,000 gallons of water daily, which amount appears to be ample for the needs of those to be supplied. These plants have been provided with steam connection with the boiler so that cans and vessels brought for water may be steamed before being filled for issue. The tanks themselves are sterilized in like manner every two weeks, and the water examined for bacteria before and after each sterilization.

A daily inspection of bancas and launches has had beneficial results, and at this time they are in excellent condition. Much improvement has taken place in the sanitary status of the inter-island transports, due to the active cooperation of the depot quartermaster, whose prompt compliance with the recommendations of the inspector has led the masters of these transports to understand that a good sanitary condition on board is essential to the retention of their charter. These transports are inspected on arrival at Manila and again before clearing.

RACIAL PREVALENCE OF DISEASE AND INJURY IN THE ARMY.

The enrollment of about 5,000 native Filipino scouts having added a new racial element to the Army, it becomes a matter of much interest to study the comparative effects of disease on them and on our white

and colored troops. For the whole Army, at home and abroad, during the year 1902 the white troops showed an admission rate of 1,706.33 per thousand and a death rate of 14.40. The negro troops had 1,897.74 admissions and 24.11 deaths per thousand, and the Malay scouts 1,707.21 admissions per thousand and 24.04 deaths. The white race, therefore, gave the lowest figures in sickness and much the lowest mortality. The black race led in both, although the Malay closely approached it in death rate.

In injuries the Filipino soldiers were singularly fortunate, having an admission rate of only 76.87 per thousand, much less than one-half the colored rate, 194.25, and scarcely more than a third of the white rate, 211.14. Their entire mortality from injury was from gunshot, 7 men in all. Certain infectious diseases, rare at all times in the Army and not common in the Philippine Islands, did not occur among the scouts, such as scarlet fever, diphtheria, and cerebro-spinal fever. On the other hand, their percentage of measles was about half that of the white troops, and the prevalence of mumps was over twice as great. In admissions for consumption they exceeded slightly the white men, but fell far below the negro troops. In smallpox no great difference in prevalence was observed, although the Filipino troops led. In typhoid fever the Malay rate for admission and death was only one-fourth of the white at home and abroad.

Malarial diseases throughout the entire Army caused a very much greater percentage of sickness and death among Philippine scouts than among either white or colored soldiers of American birth. The white and colored rates did not greatly vary, being 242.82 and 274.98 admissions per thousand, respectively, and a mortality of only 0.38 and 0.23 per thousand, while among the native scouts 707.84 admissions per thousand to sick report were caused by malaria and 1.66 men per thousand died.

Dengue was also more prevalent among the scouts.

Asiatic cholera, which caused 4.72 cases and 2.83 deaths for each thousand white soldiers in the Army, showed 15.68 admissions and 7.96 deaths per thousand in the negro regiments and 16.58 admissions and 10.15 deaths per thousand for Filipino troops. When allowance is made for the large number of white soldiers in the United States and not exposed to cholera, the rates for races do not so greatly differ.

The one infectious disease which was almost entirely confined to the soldiers of Malaysian blood is beri-beri. Scarcely known among white troops, slightly more common in colored, it caused an admission rate among the native scouts of 123.92 per thousand and a death rate of 6.01 per thousand, exactly one-quarter of their entire mortality for the year.

Of venereal diseases the scouts showed only a little more than one-fourth prevalence compared with white troops, and slightly more than one-sixth the colored rate. A considerable number of the scouts are, however, married men.

The freedom of the Filipino from the vice of drunkenness is strikingly shown when we find that out of 5,000 men only 3 individuals were treated for alcoholism in one year, and that while white soldiers were admitted to sick report on account of their own misconduct in the use of alcohol at the rate of 24.78 per thousand, and colored troops at the rate of 11.70, the Malay scouts showed the extremely small admission rate of 0.62 per thousand.

In resisting gastric and intestinal diseases (cholera excepted) the Malay soldier appears, from the records of 1902, to have a great advantage over both the white and colored Americans. To dysentery, acute and chronic, he is apparently subject to one-third the extent of his white comrade, to other diarrheal diseases less than one-half, and he has about the same proportionate immunity to other diseases of this class—dyspepsia, colic, constipation, gastritis, etc.

Without going further into specific diseases it seems, generally speaking, that Filipino troops exceed greatly both white and black in infectious diseases, excepting dysentery and typhoid fever, and that including these last they are much less subject to diseases affecting the digestive organs.

In diseases of the nervous system (excluding beri-beri as an infectious disease) the difference is even greater, the prevalence among Malay soldiers being only about one-fourth of the white rate.

Diseases of the circulatory and respiratory systems, the genito-urinary system, the lymphatic system, diseases of the muscles, bones, and joints, the eye, ear, nose, and throat, also the unclassified diseases, vary in different degrees for the different races, but in all the Filipino scouts show the smallest rate, while in skin diseases they lead the others.

Full statistics of the comparative prevalence and mortality in each disease and injury among soldiers of the three races represented in the Army appear at the end of this report, but however interesting and instructive they may be to the general reader, they are somewhat misleading in certain diseases for the reason that many of the most serious maladies prevail more extensively in the Philippine Islands, and as a large part of the white force and some of the colored were not subjected during 1902 to Philippine conditions, and as all the scouts were so exposed, it seems best to make a few further comparisons between the health of the Malay soldiers with white and colored troops actually serving in the Islands.

During 1902 there was a mean strength in the Philippine Islands of 30,300 white soldiers, 2,642 colored, and 4,826 native scouts.

Ever since the American occupation of the Philippines, the health of the forces there serving has been mainly affected, first by malarial fevers and results, second by dysentery and diarrheal diseases, and third by dengue and other febrile conditions of undetermined character. In 1902 cholera appeared and made a heavy impression on the rates of sickness and death. Comparing carefully the effects of the foregoing diseases on white, black, and Malay, some rather unexpected results are obtained, tabulated briefly as follows:

Special diseases in Philippine Islands, 1902, by races, admission rate and death rate per 1,000 of strength.

Disease.	White troops, 30,300.		Colored troops, 2,642.		Malay troops, 4,826.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Malarial fevers and results	442.18	0.70	374.72	0.38	707.83	1.66
Dengue	173.63	.....	190.01	.....	147.12	.....
Fever, undetermined	17.96	.....	19.30	.....	35.02	.....
Dysentery, acute and chronic	133.33	4.85	80.25	1.89	24.45	.88
Diarrheal diseases	399.67	.43	275.17	.....	95.43	.....
Cholera	11.16	6.70	25.36	11.35	16.68	10.16

From this table the Philippine scouts serving in their own country are seen to largely exceed the white and colored American troops in admission rate and mortality from malarial fevers, in fact, to more than double the colored rates. They had nearly as large a percentage of dengue and over twice as much fever of undetermined origin.

Their comparative immunity to dysentery and diarrhea is much more strikingly shown than when compared to the whole Army. The white troops had nearly six times as much dysentery and six times as many deaths from this cause per thousand, while the colored ratios were about three times as large. Four times as much diarrhea prevailed among the whites and thrice as much among the negroes.

The native of the Philippines eats and drinks with comparative impunity articles of food and foul water, the use of which by white men is disastrous, but he has no such immunity to cholera, and we find that in the present epidemic the admission and death rates in 1902 for native troops greatly exceeded those of the white soldiers, although the American negroes were the greatest sufferers of all.

PREVALENCE OF SPECIAL DISEASES.

SCARLET FEVER.

Eighteen cases, with 1 death, were reported during the calendar year. Seventeen of these were in the United States, with only 1 in the Pacific islands.

MEASLES.

A considerable increase in measles over the previous year was reported. There were 1,164 cases for the whole Army, or 14.41 per thousand, and 28 deaths occurred, equivalent to 0.35 per thousand. In the United States, 834 cases and 24 deaths were noted, from widely scattered points, but of these, 381 cases and 18 deaths took place at the Presidio of San Francisco, Cal., during the first half of the calendar year. This serious outbreak was discussed in the last annual report of the Surgeon-General. Measles among troops in the Philippine Islands was not half so prevalent nor so fatal as in the United States, as there were 328 cases there, with 4 deaths. From Cuba and Porto Rico only 2 cases were reported.

MUMPS.

Of this disease there were 1,276 admissions, equivalent to 15.80 per thousand of strength, a slight increase over the previous year. There was no fatality, and the rate for troops in the United States was 17.26 per thousand, compared with 23.23 in 1901. The increase in the Pacific islands was marked, being, for 1902, 15.20 per thousand, while in 1901 it was 12.40. Sixteen cases only were reported from Cuba and Porto Rico.

SMALLPOX.

There was very little change in the admission rates of smallpox and varioloid. In all 105 cases were reported, equivalent to 1.30 per thousand of strength. Thirty-nine cases occurred in the United

States with 2 deaths, and 63 cases with 12 deaths in the Pacific islands. From Cuba 3 cases, none fatal, were reported. The mortality of the Army was 14, or a ratio of 0.17 per thousand, and is a decided decrease, as in 1901 the death rate was 0.40 per thousand.

From December 16, 1902, to January 3, 1903, 10 cases of discrete smallpox were reported among the crew (civilian employees) of the U. S. army transport *Liscum*, docked at Shanghai. The disease in a severe form prevailed among the Chinese coolies of the city, and the crew was daily exposed to contagion. The cases were isolated, the vessel twice fumigated, and all clothing, etc., disinfected. No death occurred among the patients.

INFLUENZA.

In the whole Army 1,048 cases were reported, with no mortality. The admission rate, 12.97, was a great improvement over that of 1901, when 28.20 cases per thousand of strength were admitted to sick report. The prevalence in the Army at home stations was about eight times as great as in the Philippine Islands.

DENGUE.

This disease gave an enormous admission rate in the Philippines, where 6,473 cases, equivalent to 171.39 per thousand of strength, were reported. In the United States 18 cases occurred, and in Cuba and Porto Rico only 1. No death resulted among this large number of cases. At Jolo, in the Philippine Islands, there were several hundred admissions from dengue, and in several reports from that place Contract Surg. H. A. Eberle, U. S. Army, describes the symptomatology and cause of the disease. He has made many examinations of the fresh blood of dengue patients, and believes he has discovered the parasite of the disease. His views have not, however, been corroborated by observers in the Manila laboratories.

DIPHTHERIA.

There were 21 cases of diphtheria in the whole Army, with 1 death; of these, 15 cases were in the United States, 4 in the Pacific islands, and 2 in Cuba and Porto Rico.

YELLOW FEVER.

Yellow fever does not now exist on United States territory, and no case has originated in Cuba for about two years, notwithstanding that Cuba during this time has had a larger nonimmune population than ever before and that occasional cases of yellow fever have been brought to her shores from infected Mexican and South American ports. The sanitary authorities of the island, recognizing infected mosquitoes to be the sole carriers of infection and therefore the only source of danger, have admitted these cases to public hospitals for treatment, under proper precautions, with not a single instance of transmission to another individual. Seldom has the work of a scientific man for humanity been so quickly and positively followed by practical results as have the now historic experiments of Walter Reed

and his associates. A little concerted action on the part of the countries whose ports still harbor the disease, and the most terrible malady of the two American continents will undoubtedly disappear forever. Its continued existence outside the jurisdiction of the United States and the Cuban Republic will considerably add to the difficulties and expense of sanitary work connected with the construction of the proposed isthmian canal.

The recently published bulletin of the Public Health and Marine Hospital Service, containing the experiments of the working party of scientists at Vera Cruz, Mexico, which have demonstrated in the bodies of infected mosquitoes of the family *Stegomyia* the actual germ of yellow fever, should remove the last doubt remaining in the minds of the most incredulous that the disease is on the eve of total extermination and that the danger of its descent on our shores is gone forever.

TYPHOID FEVER.

Typhoid fever in the past calendar year caused 565 admissions and 69 deaths, a rate per thousand of 6.99 cases and 0.85 deaths. This was a slight increase over the previous year. The army in the United States was much more severely affected than the force abroad, for in Cuba and Porto Rico the admission rate was only 4.28 and the death rate 0.61 per thousand, in the Pacific islands 5.56 and 0.87, respectively, while at home the admission rate was 8.58 per thousand and 0.86 the death rate. The proportion of cases in which exact diagnosis is practicable by blood examination is larger year by year, and the above figures are believed to more accurately represent the real infection of the Army by the disease than ever before.

Typhoid fever, so widely spread throughout the United States, seems to have been unusually prevalent in 1902 and 1903. While many of the large cities are making decided headway in the fight against this disease, the smaller towns and rural communities generally, continue to suffer apparently in a greater degree than ever before. Of all infectious diseases this is the most menacing to the country. Conveyed as cholera is in the excreta of patients, and prevented in the same way, there is little doubt that if its onset were as sudden, its symptoms as terrible, and its mortality as great, a combined public movement would long ago have practically stamped it out. The long period of incubation of typhoid fever, its insidious onset, and the large number of ambulant cases which are never recognized are all causes for its wide dissemination, and at the same time render it very difficult to trace the origin of cases and thus demonstrate to the public the sanitary defects which maintain the disease in its midst. It is an open question whether the annual loss to the country from an endemic disease like typhoid fever, with its 9 per cent mortality and long period of disability, is not greater than would be caused by an occasional general epidemic of cholera, with 70 per cent mortality but short duration of sickness. Cholera at least tends to disappear, sometimes for long periods of years, while typhoid fever shows no such tendency.

The army in the United States is so exposed to typhoid fever that no matter how perfect the sanitation of a post an occasional case is unavoidable and in the majority of instances can be traced to a neighboring community. Where several cases occur in rapid succession all

possible efforts are made to trace the origin and discover the local cause for its extension. In nearly every such investigation during the past year the post water supply has been proved beyond suspicion, but in all cases possibility of infection by flies, dust, personal contact, and fomites has been demonstrated.

At the last session of Congress an appropriation was made for the publication of the full report of the Army Board on the Origin and Spread of Typhoid Fever in the United States Military Camps during the Spanish War of 1898, of which only an abstract has been printed. Prof. Victor C. Vaughan, the only surviving member of the Board, now has the task of finally editing the manuscript for the press, and it is hoped its appearance will not be long delayed. This is the most valuable and exhaustive contribution to the epidemiology of typhoid fever ever written, and the experience of the last few years strengthens all the conclusions of the Board.

Among the outbreaks of typhoid fever, by far the most serious and far-reaching in its effects was that occurring in camp at Fort H. G. Wright, Fishers Island, New York, in August and September, 1902. The post was a newly established one and had been garrisoned for only a few months by the Second and Twelfth Companies, Coast Artillery. Many of the buildings were incomplete, and much of the reservation was undergoing leveling, grading, filling, and blasting for roads, several hundred laborers, mostly Italians, being engaged in this work. A few temporary shanties used as eating houses by them and some rudely constructed stables for the contractors' horses, as well as several more or less offensive outhouses, existed on the reservation. On July 27 and 29 five companies of Coast Artillery arrived to take part in the combined Army and Navy maneuvers of 1902, the Fiftieth, Eighty-fifth, and Eighty-sixth from Fort Wadsworth, N. Y., and the Fifty-first and One Hundred and Twenty-third from Fort Hamilton. A camp was established on the only available spot, a grass-covered plain immediately on the seashore, distant about a quarter of a mile from the post buildings. No preparation of the camp site had been made for the occupancy of troops. Two wells from which the post water supply was drawn were situated about 150 yards from the nearest tents, but water was not piped to camp during the first week. A large pond of fresh water very near the shore and about 200 yards from camp was used by the men for bathing and washing their clothing. Sinks were dug for the disposal of excreta and kitchen garbage very near the sea, from 60 to 100 yards from the kitchens. The pits were shallow, water being reached in 3 feet, and the wet sand excavated was not a suitable covering for the dejections. Garbage carts, draft animals, and scavenger service were lacking.

On August 1 Maj. W. F. Carter, surgeon, U. S. Army, reported for duty and recommended that the sinks be moved farther from camp, which was done. The second line of sinks was established farther down the shore, but under the same conditions of sandy soil and high ground water. Quicklime was procured and orders issued to cover all excreta with lime and earth. Owing probably to change of food and water, diarrhea was from the first very prevalent among the troops in camp, about 60 per cent of the command being more or less affected and many going on sick report from this cause.

On August 9, Corpl. W. J. D., One Hundred and Twenty-third Company, Coast Artillery, from Fort Hamilton, was taken into the post

hospital with suspicious symptoms, he having been previously suffering from the prevalent diarrhea, and the Widal test proved the case to be typhoid fever.

On August 16 Maj. Walter D. McCaw, surgeon, U. S. Army, reported for duty, relieving Major Carter, and recommended that sanitary latrines, as provided for by General Orders, No. 170, Adjutant-General's Office, Washington, D. C., September 26, 1899, be constructed. Work was begun on these latrines; but as the troughs could not be purchased at New London in the required time, they were never completed, and the use of the pits continued.

August 18, a recruit was received by one of the companies of the permanent garrison who was well advanced in typhoid fever on arrival. He came from Chattanooga, Tenn., by way of Fort Slocum, N. Y.; and as he never visited camp, but was taken into the post hospital immediately, his case has no relation to the outbreak in camp.

On August 21, a case of typhoid fever occurred in the Eighty-fifth Company, Coast Artillery. This company had come from Fort Wadsworth, N. Y., where no typhoid fever had existed for several years, and, having been in camp twenty-four days, this may fairly be regarded as the first non-imported case in the command at Fort H. G. Wright. A company epidemic followed, and between this date and September 11 (when the company had returned to Fort Wadsworth) 25 cases occurred in the Eighty-fifth Company, 22 at Fort H. G. Wright and 3 at Fort Wadsworth. No immediate connection could be traced between the cases in this organization and the first in the One Hundred and Twenty-third Company, and this last company developed only 1 more case at Fort H. G. Wright, August 30, and 1 after return to Fort Hamilton, September 20.

The Fifty-first Company escaped with 3 cases, August 21, 1 at Fort H. G. Wright and 2 at Fort Hamilton. The Eighty-sixth Company escaped entirely at Fort H. G. Wright, but had 1 case at Fort Wadsworth, September 30. The Second and Twelfth companies, comprising the permanent garrison and living in barracks, escaped without a case (except the recruit noted above), and no typhoid fever occurred among officers of the camp or post or among members of the Hospital Corps.

The Fiftieth Company had no typhoid fever until August 30, but between this date and September 17, 15 cases developed, 3 at Fort H. G. Wright and 12 at Fort Wadsworth. Meanwhile the troops in camp had been increased on August 24 by the arrival of the Sixty-ninth Company, Coast Artillery, from Fort Monroe and Companies K and L, Third Battalion of Engineers, from Washington Barracks. None of these last organizations had typhoid fever while in camp, but 1 case developed in the Sixty-ninth Company after its return to Fort Monroe and 7 in the two engineer companies at Washington Barracks.

On September 4 Maj. Charles B. Ewing, surgeon, U. S. Army, relieved Major McCaw, and, the maneuvers over, the camp was broken up between the dates of September 7 and September 14.

In summing up the results of this outbreak, a total of 57 cases occurred, as follows: At Fort H. G. Wright, 30, of which 2 were imported; Fort Wadsworth, 16; Fort Hamilton, 3; Fort Monroe, 1; Washington Barracks, 7.

No history of typhoid fever on Fishers Island could be obtained, and its presence among the laborers on the reservation for the past year

was positively denied. Cases existed at New London, Conn., and some of the men from camp visited the town on pass, but the large majority did not. Conditions in camp which might be considered predisposing to an outbreak of typhoid fever were high ground water, clouds of dust from the neighboring upturned ground, flies in large numbers, ineffective disposal of excreta, the prevalence of diarrhea, and the neighborhood of the fresh-water pond in which the men bathed and from which drinking water may have been carelessly taken by some individuals. The well water of the post supply at once came under suspicion, but subsequent examination has demonstrated its purity.

Immediately upon the appearance of the disease orders were given to boil all drinking water and forbidding bathing in the pond. All cases of a febrile nature were promptly isolated and sent to the post hospital for treatment. Daily inspections were made of the tents, kitchens, and sinks. The grounds were kept well policed and the sinks were covered several times a day. During the height of the outbreak the troops were actively engaged in the maneuvers, simulating war conditions as closely as possible, and were kept so hard at work in the fortifications and at the guns that it was difficult to give the attention to camp sanitation and personal hygiene that the situation demanded.

The noticeable features of this outbreak were the absolute immunity of the permanent garrison in barracks, the comparative immunity of the Fifty-first, Sixty-ninth, Eighty-sixth, and One Hundred and Twenty-third Companies, and the excessive prevalence of the disease in the Eighty-fifth and Fiftieth Companies. These two companies lay on opposite flanks of the camp and were separated by three almost uninfected organizations. The possible causative factors of water supply and dust were common to all in camp and garrison and should have affected all alike. Allowing rather largely for the element of chance, it is quite possible that flies carried infection from the inefficient sink system to the company kitchens. It is most probable, however, that the disease was largely spread from man to man in the same company by personal contact or by fomites. The old lesson is thus repeated, that nothing less than complete and immediate destruction or disinfection of all human excreta, along with the most careful personal hygiene, can be relied on to prevent the spread of typhoid fever once introduced in permanent camps. To attain the first, the sanitary latrines provided for by General Orders, No. 170, Adjutant-General's Office, Washington, D. C., September 21, 1899, have proved satisfactory, and Circular No. 62, Adjutant-General's Office, Washington, D. C., December 24, 1902, gives in language simple enough to be understood by every enlisted man, rules of personal hygiene, which, if observed, should prevent such another outbreak in any camp of United States troops. The disposal of excreta in pits should be limited to marching commands and camps of the most temporary nature.

At the close of the epidemic at Fort H. G. Wright, Maj. Walter Reed, surgeon, U. S. Army, was sent to investigate the causes of the outbreak, but his death, which occurred soon after his return to Washington, prevented the expected report.

The prevalence of typhoid at Fort Wadsworth, N. Y., Fort Hamilton, N. Y., and Washington Barracks, D. C., was a direct sequence of the outbreak at Fort H. G. Wright, and calls for no special remark. A few cases occurred at these posts which could not be connected with the maneuvers. Cases evidently not of local origin, and in many

instances clearly traced to other places, occurred at Fort McPherson, Ga., Madison Barracks, N. Y., Fort Niagara, N. Y., Fort Columbus, N. Y., Fort Rodman, Mass., Fort Warren, Mass., and several points in the West and South.

At Fort Getty, S. C., 17 cases occurred in 1902. Rain water collected in cemented cisterns from new slate roofs is used and again the water supply may be eliminated as a cause. The surgeon attributes the infection to the city of Charleston, where the soldiers go on pass and where typhoid fever is present to a greater or less extent throughout the year.

Forts De Soto and Dade, on the Florida coast, also use cistern water apparently above suspicion, yet the former had 5 cases between October 23, 1902, and January 6, 1903, and the latter a decided epidemic of 16 cases in January, 1903. The infection is attributed to the city of Tampa, but in the case of Fort Dade especially, it seems clear that some local cause permitted the spread of the disease once introduced. At neither post nor at Fort Getty, S. C., was the present modern sewerage system completed at the time of the outbreak, and infection carried from exposed excreta by flies can not therefore be excluded. It would appear that any method of excreta disposal which does not at once remove, destroy, or disinfect is not without danger, even in garrisons where the men are well housed and provided with lavatory facilities, and that it is advisable to use the sanitary latrines provided for in General Orders, No. 170, Adjutant-General's Office, series 1899, at posts without sewers or pending the completion of the same, as well as in permanent camps.

A severe outbreak occurred in Troop E, Thirteenth Cavalry, at Camp Merritt, Mont., and after the troop had returned to Fort Keogh. First Lieut. Paul C. Hutton, assistant surgeon, U. S. Army, arrived at the camp after 5 cases had developed, and reported as follows October 2, 1902:

F Troop, Thirteenth Cavalry, Capt. G. H. Preston in command, arrived at this station at 1.30 p. m. September 29, 1902. A sanitary inspection was at once made by Captain Preston and the undersigned and the following condition found: The water which was being used by E Troop, Thirteenth Cavalry, for bath, drinking, and cooking purposes was taken from a spring situated on the banks of Lame Deer Creek, immediately in rear of the troop barracks. This creek had been dammed up 15 feet above this spring by a dam 5 feet high, consisting of oat sacks containing sand and earth. This caused a depth of 4½ feet of stagnant water in the creek in the vicinity of the dam, and in this water the men of the command bathed, washed their clothing, and watered their horses. The water at this point was 7 feet above the bottom of the spring and the spring 15 feet downstream from the dam, thus permitting free seepage into the spring from the stagnant and probably infected water of Lame Deer Creek.

The present commanding officer has been informed that this spring was readily dipped dry prior to the erection of this dam, but that after its construction the spring furnished water in abundance. At reveille on the morning of the 30th this dam was broken, revealing a large accumulation of organic matter on the creek bottom and against the dam.

Contract Surg. H. D. Belt, who was at this station about two weeks prior to the arrival of F Troop, Thirteenth Cavalry, stated that he had recommended the use of boiled water exclusively, and the former commanding officer remarked that he had boiled water for a time after this recommendation but the men of the command refused to drink it and he discontinued the practice. No bacteriological examination of this spring and stagnant water has been made, but it is believed that backwaters were infected with the germs of typhoid fever. When this water supply was inspected the drinking utensil at the spring was thrown away and the spring immediately nailed up by direction of the present commanding officer.

Flies also are believed to have been concerned in the propagation of typhoid fever. They existed in countless numbers and were found swarming over the fecal matter in

a shallow privy situated 80 yards from the troop kitchen. The excrement was not covered by earth, and proximity to the kitchen rendered infection of food possible. This privy was demolished and filled up without delay by direction of Captain Preston. It is believed, also, that flies were attracted to this point by the large quantities of horse manure which had been permitted to accumulate in the vicinity of the barracks and upon the reservation. Horses had been ranging at large within the reservation inclosure and horse manure was scattered throughout. Five hundred wagon loads of this manure were burned by direction of the commanding officer, F Troop, Thirteenth Cavalry, and the entire reservation is now receiving a thorough policing.

Five cases of typhoid fever were found here and 1 case developed the afternoon of arrival. These cases were cared for in the station hospital, an old log building with no conveniences and in horrible repair. Five Sibley tents were at once secured and a typhoid camp established 500 yards from the post, at a point sheltered by pines and protected on three sides by high hills. Here these patients were made comfortable, and danger of infecting the command reduced to a minimum.

It is difficult to determine accurately just how the water supply here became infected with typhoid germs, but it is thought that the disease existed at some point along the creek above here within the past year, and that the still water about the dam, which contained organic matter, permitted the germs to multiply.

The troops were withdrawn from Camp Merritt early in October, 4 more cases occurring at Fort Keogh in the same organization.

November 29, 1902, an outbreak of typhoid fever was reported from Fort Sam Houston, Tex. The first two cases were imported and came under observation October 14 and 20. The first case locally acquired was taken into hospital November 2. The last admittance was December 20, and in all there were 29 cases, with only 1 death. On January 14, 1903, Maj. Charles F. Mason, surgeon, U. S. Army, reported the cessation of the outbreak with the following remarks:

It will be seen that until October 14, the date of admission of Lieutenant C., there had been but 1 case at the post during the year, that of Private G., who was admitted June 27 and died August 26. This case probably had nothing to do with the later cases. The present group began with Lieutenant C., who contracted the disease while on detached service at Palestine, Tex., and was admitted to hospital October 14, after having been sick and complaining for at least a week. On October 20 Private G., Company K, Fourth Infantry, was admitted to hospital. He also contracted the disease while on detached service at Camp Leon Springs, and had already been sick several days when he returned to the post October 17. These two cases mark the introduction of the infection into the post. Both were in the second week of the disease when they applied to the surgeon, and meantime had been scattering the infection broadcast.

On November 2, fifteen days after G. returned to the post, the next case reported in the person of a private, Troop B, Twelfth Cavalry, who had not been out of the post. On November 15, 2 cases developed, and after that there were new cases almost daily until December 11, since which time there has been only one case, that of Private T., Hospital Corps, one of the nurses on duty with the typhoid patients, who was admitted December 20. As to the cause of the outbreak, after most careful investigation and deliberation I am of the opinion that the infection was brought into the post by the first two cases; that during the incubation period they infected the closets, the flies, and perhaps the soil; that thereafter the infection was spread from person to person largely by means of flies, but also by means of infected persons, shoes, clothing, and bedding.

My reasons for this conclusion are as follows: The water supply is from artesian wells 800 feet deep, and is exactly the same as that of the West Texas Military Academy, a boarding school with about 150 scholars just outside of our gates, and which had no typhoid. It is also the same as that of the city of San Antonio, where there were only sporadic cases. Milk may be excluded by the fact that only about one-half of the men had used milk in any form. The same remark applies to raw oysters and vegetables. Flies have been more numerous this fall than ever before. The kitchen and mess hall of the general mess were entirely unprotected from them. The men frequently fail to flush the water-closets after use, thus leaving fecal matter exposed to flies. The monthly physical inspection of the men has shown that their drawers are frequently more or less smeared with fecal matter. The method of washing dishes and utensils at the mess is crude and opens the door to infection;

the washing is all done by hand, the utensils being often placed on the floor, which is covered with water in which the men wade with their, perhaps infected, shoes, and in which they place the brooms used for cleaning the utensils. Many of those now sick with typhoid had been on duty at the mess as dish washers, waiters, etc., just prior to entering the hospital, and it is very easily seen how they could infect their hands and thence the food and dishes handled by them. The measures used for the suppression of the outbreak have been the prohibition of the use of any uncooked food and its protection from flies, the latter end having been largely effected by the advent of cold weather, the immediate disinfection of all clothing and bedding of typhoid patients as soon as the case was diagnosed, the daily disinfection of all closets and seats for the purpose of protection against infection from ambulant cases, and the prompt removal to hospital of all suspects. In addition every possible source of infection was investigated and corrected by the prompt and cordial co-operation of the post commander.

There was 1 death in the 29 cases, a mortality of 3.44 per cent. While most of the cases were very severe, there were a few that were very mild. Some of these mild cases were followed by a very severe relapse. All the cases of fever lasting more than forty-eight hours without local lesions, without the plasmodium, and in which there was an enlarged spleen and positive Widal reaction were considered typhoid.

All the 29 cases gave a positive reaction at some stage, though often the first or second specimen was negative. Twenty-two of the cases were tested for agglutination with paracolon bacillus with negative results in all.

Diazo reaction positive at some stage	27
Diazo reaction negative throughout.....	2
Rose spots present	20
Rose spots absent throughout.....	9
Enlarged spleen present	28
Enlarged spleen absent	1
Hemorrhage from bowels.....	5

In conclusion, I wish to call attention to the excellent work of the hospital corps nurses; it was faithful, intelligent, and skillful, as evidenced by the results attained. I have never seen better work even by female trained nurses.

From Fort Leavenworth, Kans., the largest military post in the United States, the surgeon, Lieut. Col. John Van R. Hoff, deputy surgeon-general, U. S. Army, reported, April 6, that in his opinion typhoid fever was endemic, and attributed the source to the water supply, which is that of the city of Leavenworth and comes from the Missouri River. The sewage of Fort Leavenworth and the United States prison on the reservation is discharged into the river above the intake of the city waterworks. In December, 1902, the medical officers of the post began a searching investigation into the causes of the disease. The milk supply, the use of green garden produce, and the possibility of contact infection were investigated, and much stress was rightly laid upon the fact that of 9 cases in the United States prison 8 had been confined six months or longer, and only 1, a recent case, had been sick on arrival. These prisoners work at different places on the reservation, and had used only the city water unsterilized. The surgeon's conclusions are as follows:

It will be observed that of the 13 cases in the post, 11 can safely be classed as of local origin, 1 of foreign origin, and 1 doubtful. Of the 9 cases occurring in the United States prison at this place, 8 are of local origin and 1 case had the disease when admitted, making a total of cases of local infection, 19, foreign infection, 2, and doubtful, 1, 22 in all. It will be further observed that the Sixth Infantry, Troops G and H of the Fourth Cavalry, and Twenty-eighth Battery Light Artillery, stationed at this post, did not contribute any case; that the water used for drinking purposes is the same for all troops stationed here, as well as for the inmates of the prison; that the practice as to sterilizing water varies but little in the different organizations; that the habits as to visiting the city of Leavenworth, buying milk for drinking purposes, etc., vary but little in the several organizations; that the use of green vegetables by the various organizations does not materially differ; that careful sanitary

inspection of the quarters and customs of the different organizations in which typhoid appeared revealed nothing different from those in organizations free from this disease which would indicate a cause for the infection.

Based upon the foregoing, the surgeon is unable to state why these particular organizations should be affected and others, apparently under the same conditions, escape. Nevertheless, considering the well-known fact that this command is drinking a more or less concentrated solution of its own sewage, it is not difficult to believe, though impossible to demonstrate, that the source of infection is in the water supply. The disease thus far has probably attacked the most susceptible, but, in view of the state of the water supply, it is not unlikely that the poison, to which each case adds potency, will soon become more virulent and the epidemic extend.

The number of cases of typhoid fever now under treatment in the town of Leavenworth could not be definitely ascertained, but it is believed that many such exist.

In view of the foregoing, the surgeon is of the opinion that every possible precaution should be taken to prevent further infection of this command, and particularly should all water used for drinking or culinary purposes be sterilized.

In spite of stringent orders to boil all drinking water, it has been found impossible to compel its exclusive use by all members of such a large community, and while the spread of the disease has been undoubtedly checked, cases of typhoid fever may be expected until the purity of the water supply of the town and garrison is rendered beyond suspicion.

At the U. S. Military Academy, West Point, N. Y., five cases of typhoid appeared among the cadets between March 18 and April 13, 1903, the indications being that a portion of the milk supply was infected. The surgeon, Lieut. Col. Valery Havard, deputy surgeon-general, U. S. Army, reported, May 1:

The source of the contagion is unknown. For over a year there has been no typhoid fever on this reservation, and only two cases in the neighboring town of Highland Falls, which cases had entirely recovered more than a month before the inception of our first case. Furthermore, these two patients, their relatives, and their friends had no connection of any kind with the post.

The water supply is thought to be above suspicion, being entirely under our supervision and control and removed from ordinary causes of contamination.

The milk supply (from 150 to 180 gallons daily) has been open to suspicion. Until April 1 it was obtained from a dealer who collected it from a number of dairies, too numerous and distant for inspection. On April 1 the contractor was changed and the milk obtained from a different locality. A clause of the new contract provides that the necessary quantity must be obtained from no more than three dairies, which must be acceptable to the authorities of the Academy, they having been inspected and found satisfactory. Arrangements are being made by the same contractor to furnish the entire supply from only one dairy, which will submit to all our requirements. Meanwhile, all the cans are thoroughly sterilized with boiling water and steam by the contractor before being returned to the farmers, who are enjoined to pour in their milk without any previous washing or rinsing. As a further precaution, all the milk used by cadets for drinking purposes is pasteurized in the cadet kitchen.

There is no proof that these cases of typhoid are the result of infected milk, but the following circumstances would seem to point that way:

1. The five patients were fond of milk and drank it freely.
2. They had seats at different and widely separated tables in the large mess room, thus indicating a common article of food as the source of infection.
3. Assuming the incubation period to be two weeks, no more cases were contracted after April 1, date of change of the milk supply.
4. The only other articles of uncooked food used in the mess are butter and fruit (apples, oranges, and bananas), articles seldom considered suspicious or likely vehicles of the typhoid bacillus.

There was no further infection among the cadets, and all the patients recovered.

MALARIAL FEVERS.

There were 21,996 entries on sick report for malarial fevers and chexia, equivalent to an admission rate of 272.30 per thousand of

strength, and a death rate of 0.45 per thousand, divided as follows: Intermittent fevers 18,410 cases, admission rate per thousand 227.91, discharge rate 0.02, deaths none; remittent fevers 3,098 cases, equivalent to 38.35 admissions per thousand, no discharge, and death rate 0.09; pernicious malarial fevers 38 cases, 0.47 admission rate, no discharge, death rate 0.26 per thousand mean strength; malarial cachexia 450 cases, with rates of 5.57 for admission, 0.05 for discharge, and 0.10 for deaths.

For the whole Army the reduction in the prevalence of malaria, compared with the calendar year 1901, when the rate was 380.37, is very marked. That this reduction is general at home and abroad is seen by comparing the 1901 rate in the United States, 113.33, with that of 1902, which is 96.29. In the Pacific islands in 1901 the rate was 516.13; in 1902, 471.41. Blood examinations for the malarial organisms are now made in a far greater number of cases than before, as the decrease in the number of small and remote stations has been so great that microscopes are nearly everywhere available. Also the number of admissions for "fever undetermined," among which many irregular malarial fevers and some mild typhoid cases have probably always escaped recognition, was much less than in 1901. Of these admissions there were only 1,107 for the whole Army, equivalent to a rate of 13.70 per thousand, while in 1901 there were 1,805 admissions, a rate of 19.52 per thousand. As is usually the case, no mortality was reported from the undetermined fevers, and the decreased rate, in connection with the lower figures for malaria, is gratifying. For the decade 1888 to 1897, when the whole Army was in garrison in the United States, the admission rate from these unclassified fevers was 12.03 per thousand, which is very nearly approached by the rate for the past calendar year.

In the summer of 1902 the work of exterminating mosquitoes was actively prosecuted at stations in the United States where malarial fever has always been prevalent. The result has been a diminution of the disease and a decided increase in the comfort of the garrisons by lessening the numbers of the insects whether malaria bearing or not. In some cases, owing to enormous areas suitable as breeding places for mosquitoes in the immediate neighborhood of posts and not under military government, no special results were obtained. The work is being continued this season, and as the health authorities of states and municipalities take up the subject a decided decrease of malarial fever is expected among the troops. So far the preventive work has mainly consisted of the use of petroleum on all collections of standing water impossible to drain, with such ditching, clearing of underbrush, etc., as was practicable with the labor available. At most of the mosquito-infested stations drainage work on a large scale at considerable expense will be necessary before the breeding places of mosquitoes are permanently destroyed, and at many places total extermination seems an impossibility. So far it may be said that the work done and the small expenditure for crude petroleum have been amply repaid by diminished sick rates and increased comfort. From Forts Totten and Wadsworth, N. Y., a very appreciable decrease in the number of mosquitoes was reported.

Capt. F. A. Winter, assistant surgeon, U. S. Army, reporting from Jefferson Barracks, Mo., October 14, 1902, says:

This post has had a very unsavory reputation in the past as a malarial locality, and the prosecution of a mosquito crusade during the past summer seems, from the sub-

joined data, to have been attended with results of material value in the improvement of sanitary conditions.

A factor of the greatest importance, I think, in an inquiry of this kind comes from the consideration of the comparative rainfall during the summer months in such a climate as this. I have secured data upon this matter through the courtesy of Mr. R. J. Hyatt, of the U. S. Weather Bureau in St. Louis, and shall make reference to it as far back as the year 1896.

The most instructive comparison is to be found between the year 1897 and the present year. The former year antedated, of course, the Spanish-American war and its attendant advent of tropical malaria.

The aggregate rainfall for the months of June, July, August, and September in 1897 was 9.30 inches, very decidedly below that of the average in this vicinity, as will appear from the following table of rainfall:

Rainfall, in inches, during June, July, August, and September.

1896	13. 78	1900	10. 45
1897	9. 30	1901	6. 79
1898	15. 39	1902	17. 38
1899	10. 90		

As will be seen, the year 1902 shows a total precipitation for the four months of 17.38 inches, or the heaviest in seven years. In spite of this difference between the years 1897 and 1902, the latter year showed a most signal improvement over the former in the matter of malarial incidence.

Per cent of sick with malarial disease to average strength of command.

Month.	Year.	Per cent.
July.....	1897	9. 20
July.....	1902	1. 24
August.....	1897	8. 00
August.....	1902	7. 20
September.....	1897	14. 89
September.....	1902	1. 73

Or, taking the aggregate for the three months, 1897 showed a percentage to average strength of command of 31.59, while 1902 showed only 10.17, a difference of 21.42 per cent in favor of 1902.

Conceding that precipitation favors the multiplication of mosquitoes, the year 1902 must have been signally favorable for their growth, while 1897 was very much less so; but in 1897 no effort was made to limit the growth of mosquitoes, while in 1902 attention was directed to this matter along the lines laid down by Reed and Gorgas in Cuba and Ross in the Orient.

Another fact must enter for consideration in the comparison of the two years. The troops stationed here in 1897 had never been in the tropics, while those here during the present year had but lately come from the Philippines and Cuba. The latency of tropical malaria at times is well known to those who have handled it, and the fact that April and May, 1902, two non-mosquito months at this post, showed a higher rate of admissions than either July or September speaks strongly for the disease having been an importation with the men coming from the tropics. Thus far in the present month there have been but 3 admissions for malaria, whereas in the same month in 1897 there were 22, or 12.49 per cent of the command. These figures, I think, make a very satisfactory showing.

The year 1898, showed a very large non-effectiveness, probably caused by the fact that the subjects were in the main men who had just returned from the Santiago campaign in Cuba.

A very small amount of malarial disease in the year 1901, 13.02 per cent, is explicable by the fact that it was an unusually dry year (total precipitation for June, July, August, and September, only 6.79 inches) and by the further fact that the garrison at that time was made up of a recruit squadron of cavalry, carrying with it very little or no malaria at the time of its arrival here.

It is to be hoped that it may be possible to apply more elaborate and systematic measures for the suppression of the mosquito agency during the coming summer, and that the good showing of the past summer may be improved.

First Lieut. Charles F. Craig, assistant surgeon, U. S. Army, whose work in demonstrating latent and masked malaria in the cases of many invalid soldiers sent to the general hospital, Presidio of San Francisco, Cal., from the Philippine Islands, was noticed last year, has reported more fully on this interesting subject, and states that since special attention has been paid to this matter he has observed 367 cases of masked or latent malarial infection, about one-fourth of all cases in which the malarial parasite was found. Of the 367 cases he found some variety of estivo-autumnal parasite 269 times, the tertian parasite 95 times, and the quartan 3 times. In 282 cases the parasites were few and in 82 they were numerous.

Dr. Craig's able discussion of the subject is too long to print here in full, but the following extracts are given from his report made to the commanding officer of the hospital for the past fiscal year as being of general interest:

In those cases in which the parasites were few in number it is comparatively easy to explain the latent condition of the infection; few parasites being present but little malarial poison was elaborated, not sufficient to produce symptoms of the disease. In those cases, however, in which the parasites were numerous, it is much more difficult to explain the latency of the infection. So far as I know there are no experimental data bearing upon this question, although numerous theories have been advanced to account for it. I believe that there probably exists a partial immunity to the effect of the malarial toxin, although the immunity is not sufficient to prevent the growth of the organisms. In all these cases, if untreated with quinin, symptoms of malaria do eventually appear, which I take to be reliable clinical proof of this theory.

From a study of the cases clinically it is often difficult to determine whether or not the malarial infection present is latent or masked. In many of the cases the absence of any symptoms which could be attributed to malaria made the diagnosis of latent infections easy, and, in the same way, numerous cases showed such a preponderance of symptoms due to other disease processes as to render the diagnosis of masked infections reasonable. In some of the cases, however, it was almost impossible to determine whether or not the infection was latent or masked.

Classified as well as possible in this manner, the 367 cases were divided as follows: Latent infections, 255; masked infections, 112.

The following table shows the clinical diagnosis made in these cases before the examination of the blood:

Disease.	Cases.	Latent.	Masked.	Disease.	Cases.	Latent.	Masked.
Chronic dysentery.....	70	15	55	Convalescent from operation.....	1	1	0
Chronic diarrhea.....	25	20	5	Arthritis deformans.....	1	1	0
Pulmonary tuberculosis.....	21	2	19	Furunculosis.....	1	0	1
Fractures and wounds.....	10	10	0	Retinitis.....	1	1	0
Chronic gastritis.....	8	8	0	Varicocele.....	1	1	0
Amebic dysentery.....	9	5	4	Tachycardia.....	1	1	0
Chronic indigestion.....	6	3	2	Uncinariasis.....	1	1	0
Acute bronchitis.....	3	0	3	Malta fever.....	1	0	1
Hernia.....	3	3	0	Diabetes mellitus.....	1	1	0
Otitis media.....	3	3	0	Paraplegia.....	1	1	0
Acute melancholia.....	3	3	0	Acute endocarditis.....	1	1	0
Rheumatism.....	3	0	3	Gonorrhea.....	1	0	1
Measles.....	3	0	3	Cellulitis.....	1	0	1
Anemia.....	3	0	3	Chancroid.....	1	0	1
Secondary syphilis.....	2	2	0	Acute constipation.....	1	0	1
Insanity.....	2	2	0	Hemorrhoids.....	1	1	0
Paralysis.....	2	2	0	Adenitis, cervical.....	1	1	0
Arthritis.....	2	0	2	Appendicitis.....	1	0	1
Acute dementia.....	2	2	0	Hemiplegia.....	1	0	1
Typhoid fever.....	2	0	2	Diagnosis undetermined.....	164	164	0
Pneumonia.....	2	0	2				
Abcess of liver.....	1	0	1				

A moment's observation of this table will show that the great majority of latent and masked infections occurred in patients suffering from diseases of the alimentary tract and pulmonary tuberculosis. I shall not discuss separately each class of cases,

but wish to draw especial attention to the occurrence of latent and masked infections in chronic dysentery. In very many of the cases so diagnosed treatment with quinin showed a marked improvement in the dysenteric symptoms, and in some of them complete recovery resulted. There can be no doubt that there exists a strictly malarial dysentery due to the localization of the parasites in the glands of the intestinal mucosa.

During the last three years of my service at this hospital 7 cases have been observed in which the autopsy showed a latent malarial infection unaccompanied by clinical symptoms of the presence of the parasites in the blood before death. Three of these cases have been benign tertian infections and 4 estivo-autumnal infections of the tertian type.

The pathological lesions found were confined entirely to the spleen and liver. This local pathological change is peculiar, as it was also shown to be present in the estivo-autumnal latent infections. In numerous cases coming to autopsy from other disease processes accompanied by a latent malarial infection in which the parasites were found in the blood, but in which no definite symptoms were produced, it was noticed that the chief pathological lesions were also found in the liver and spleen, but that other organs showed them to some extent. It is well known that in an acute malarial infection nearly every organ of the body is more or less involved. Thus it will be seen that from the mildest latent infection to the acute infections there is a gradual progress in pathological lesions, first manifested in the spleen and liver and spreading, according to the extent and severity of the infection, to other organs.

The most marked pathological lesions were always present in the spleen. The organ in the tertian infections was considerably enlarged and dark bluish gray in color externally, the capsule being smooth and tense, the notches distinct, and the organ somewhat decreased in consistence. Upon section the color was a dark brownish red, but did not present that intense brownish or black color found in well-marked acute infections. This, of course, is easily understood from the fact that the parasites present were comparatively few in number and that little pigment was therefore formed. Microscopically the sections of the spleen showed intense congestion of the splenic sinuses, together with pigmentation, especially marked along the edges of the Malpighian bodies and along the fibrous trabeculae. The connective tissue of the organ was not increased in amount. The cells of the splenic pulp were evidently greatly increased in number and many of the cells showed marked division of the nucleus. Many were also pigmented and distorted in shape.

The above are the chief pathological conditions found, aside from the parasitology. The splenic sinuses and capillaries contained numerous parasite-infected red cells and pigmented leukocytes. While these infected red cells were not nearly as numerous as in acute infections, or in the more advanced latent infections, still they were sufficiently numerous to be very noticeable. The parasites were in about the same stage of development in each case, but it so happened that the patients had died at such a period that the entire cycle of the tertian parasite within the human body could be worked out from the examination of sections of spleens from these cases. As far as could be ascertained, the parasites presented no essential differences in their morphology from those found in the red cells in the peripheral blood during an acute infection. The segmenting bodies were numerous in one case, the segments appearing, however, slightly more refractive and more clearly outlined than when found in the peripheral blood. In fact it may be stated as a general rule that the parasites in these infected corpuscles in the spleen were more distinct and more easily recognized than the same parasites in the peripheral blood would be. Their staining reactions were exactly the same, and it could not be ascertained that they stained more easily or more deeply than when present in the peripheral blood.

The chief point of importance in the pathology of these cases is that the entire human cycle of the parasite can be completed within the spleen when no parasites are demonstrable elsewhere in the body, thus proving conclusively that the seat of the initial malarial infection is in the spleen. While this has been the opinion of nearly all authorities for years, few observations are on record where, as in these cases, no malarial symptoms or parasites could be determined while the patient was alive, but the entire human life cycle of the parasite was apparent in the spleen after death.

Besides the infected red cells, numerous leukocytes were observed containing pigment in the form of large and small granules, and a few containing malarial parasites, some of the parasites being evidently but just engulfed and typical in appearance. There were also present very large white cells containing much pigment in large blocks, and often one or more half to nearly full grown parasites. A small amount of free pigment was observed lying within the splenic sinuses and collected around the Malpighian corpuscles and the trabeculae.

Macroscopically the liver did not differ in appearance from that of a normal organ, in so far as the pathology of malaria was concerned. One case, a latent tertian infection, was suffering from cirrhosis of the liver, which presented the ordinary appearance of that disease. The liver did not appear pigmented in any of the cases, and upon section the only thing observable was marked venous congestion. The sections of the liver showed a few pigmented leukocytes within the capillaries, some of the leukocytes containing what appeared to be degenerated malarial parasites. There was but little pigment present in the sections, most of it being within the leukocytes mentioned. No large phagocytes were observed, nor were any infected red corpuscles demonstrable.

The pathology of latent tertian infections, as shown by the above findings, is confined almost entirely to the spleen, the liver being but slightly involved. The changes in the spleen consist chiefly in an engorgement of the splenic sinuses with red cells and leukocytes, the presence of infected red cells and of phagocytic and melaniferous leukocytes, an increase in the cells of the splenic pulp with more or less degeneration and karyokinesis, and pigmentation of the organ. In the liver the chief changes consist in slight pigmentation, more or less venous congestion, and the presence of melaniferous leukocytes.

The pathology of cases of latent estivo-autumnal infections differed but slightly from that of the tertian and chiefly in the character of the parasites present.

Macroscopically the spleen appeared much as in the tertian infections, save that in all cases it was not as large or as much pigmented. Upon section the consistence was found decreased, the Malpighian corpuscles were nearly invisible, the color a dark mahogany red, the substance of the spleen being almost diffuent in two of the cases. Upon microscopical examination the same changes were found as in the tertian latent infections. The infected red cells were not as numerous nor were the melaniferous leukocytes. The parasites observed within the red cells were almost uniformly in one stage of growth, but the four cases observed showed nearly all stages of the life cycle of the parasite, no single one of them, however, showing the entire life cycle. The young forms of the estivo-autumnal parasite were similar in appearance to the young forms found in the peripheral blood, being small hyaline rings, well defined, and presenting in a fresh smear marked ameboid motion of limited extent. The older parasites were round or ring-like in shape, and contained a small amount of pigment in the form of very fine reddish brown granules, this pigment being but very slightly motile. In one case numerous segmenting bodies were observed, the segmentation always taking place within the red cell. The segments varied in number, the largest number being 24, the smallest 12. The peculiarity about the segments observed in this case was that each appeared to present the ring form which is usually found in the red cell at the earliest stage of infection. This appearance was so distinct that the red blood cell containing the segments seemed to be filled with small ring-shaped estivo-autumnal parasites. The pigment in the segmenting bodies was collected either at the center or at one side, but none of the segments contained any pigment.

Another peculiarity noted in the sections of the spleen was that no crescents were present. As is well known, in cases of acute and chronic estivo-autumnal infections, the spleen generally presents in sections numerous crescents. The only explanation of the absence of crescents in these latent infections would seem to be that the parasites had not advanced as yet to the stage in which crescent formation was possible. Numerous pigmented leukocytes were observed containing pigment in the form of minute grains and larger granules and clumps, together with a few nearly full-grown parasites. Very large white cells were observed containing much pigment, and sometimes two or even more well-formed parasites. Considerable free pigment was present in the same localities as noted in the tertian infections.

From the above description it will be seen that the estivo-autumnal parasite is capable of undergoing its entire human life cycle within the spleen, and in such numbers as not to be found in the peripheral blood upon repeated examinations.

The pathological changes present in the liver were similar to those found in the same organ in the tertian infections. No infected red cell was found, although a considerable number of melaniferous leukocytes were observed, together with some free pigment. The liver did not present macroscopically any change which would be indicative of malarial infection.

The question at once arises, in studying the sections of the organs in these latent infections, as to the reason for the non-appearance of the infected red cells in the peripheral blood. There was no difficulty experienced in finding such cells in the sections of the spleen, and it would appear at first sight that it would be impossible for the number of infected red cells which were found in the spleen to be present there only, as apparently there is no reason why the red blood corpuscles containing the parasites should not circulate freely in the blood which passes through the spleen to

other portions of the body. In considering this question it must be remembered that the number of infected red cells in the spleen was very markedly less than in more advanced latent cases, and immensely less than in the acute malarial infections. It is obvious, therefore, that there is no reason why the infected red cells could not be present in the blood, but on account of their small number be impossible to detect even after a number of examinations. It is a well-known fact that even in acute malarial infections presenting marked symptoms of the disease repeated examinations are often necessary, especially in the estivo-autumnal forms, to demonstrate even a single parasite, and I have often spent half an hour upon an examination of a case in which the symptoms were perfectly typical without finding a parasite, and only demonstrated them after a number of careful examinations. Thus it will be seen that the infected red blood corpuscles are, in all probability, not in any way confined to the spleen, but are actually in circulation in the blood as in acute infections. This also is true of the melaniferous leukocytes, which occurred in very much less number in these cases than they usually do in acute infections. Sections were made of all the other viscera in these latent infections, but in none of them could any trace of malaria be discovered, except for very slight evidences of deposition of pigment.

The reason for the intensity of the malarial infection in the spleen is not hard to understand, but it is more difficult to understand why the liver rather than any of the other organs in the abdominal cavity should have shown traces of the infection.

The chief point of value in the pathology of these cases is the fact that the malarial parasites, either tertian or estivo-autumnal, undergo their entire normal human life cycle within the spleen, and that the time-honored theory that the spleen is the seat of malarial infection is borne out by these examinations.

I have discussed in former reports the proportion of cases of latent malaria to other malarial infections and the diseases which are apt to mask the malarial symptoms. These observations have shown that a malarial infection may exist in the human being, the parasites undergoing their normal evolution, without producing any symptoms. Neither will a blood examination always prove positive in these cases.

Most of the cases described here were present in the hospital for several weeks, had repeated blood examinations, were carefully studied clinically, and in none of them was malarial infection suspected. How long this latency could exist is, of course, a question, but that it can exist for a considerable period of time is conclusively proven by many instances occurring here of prolonged latent infection.

It is obvious that puncture of the spleen in the cases described would have resulted without doubt in the discovery of the malarial infection. This procedure, however, is dangerous even in experienced hands, and is certainly not advisable as a routine measure, or in cases such as these, where no malarial symptoms were present.

In conclusion I will draw attention again to the fact that these observations conclusively prove that the malarial parasites may undergo their normal human life cycle in the body without producing symptoms, and that they are practically localized in the spleen.

In the Philippine Islands the work of preventing malaria among troops is steadily pursued, but in a country of jungles, submerged rice fields, and shallow wells, mosquito extermination is apparently hopeless, and the use of the mosquito screen is the principal defense, although other measures are not neglected.

CIRCULAR }
No. 14. }

HEADQUARTERS DIVISION OF THE PHILIPPINES,
Manila, P. I., March 26, 1903.

* The following instructions, prepared by the chief surgeon of the division, are published for the information and guidance of troops in the Philippines:

In view of the reported increased prevalence of malarial fevers at certain posts in the division, special attention should be given by post surgeons in their sanitary reports (A. R. 1571) to those methods of restricting the spread of these fevers, which experience has proved to be of value.

The use of the mosquito bar should be made compulsory, and care should be exercised to insure the best results from its use. When dropped into position at night, any mosquitoes that are netted in its interior should be killed, and the skirts of the netting should be tucked under the bedding so as to leave no entrance to the insects.

Patients in hospital should be carefully protected by the nurses or hospital corps men on duty in the wards. Special care should be given to the protection of malarial cases, that the mosquitoes of the locality may not become infected and enabled to propagate the disease from the sick to the well.

Mosquito bars should be used by the native scouts as carefully as by the American troops.

At posts where the prevalence of the disease appears to be due to local conditions, as distinguished from general topographical features, much good may be effected by a careful search for the breeding places of the mosquitoes and the destruction of their larvæ. Shallow puddles and all collections of stagnant water should be swept out once a week or oftener, or drained and filled up to the surface level. The ground in the neighborhood should be cleared of all tin cans, abandoned crockery, or other articles which would serve as receptacles for rain water. Even hoof prints on a retentive surface should be attended to.

The drainage of swampy or marshy ground which is near enough to the camp site to affect it unfavorably, and the burning of its vegetation, will have good results, and if this can not be effected benefit may be derived by diffusing a film of kerosene oil over the surface of the stagnant pools once every ten days.

The contents of cesspools, unused wells, water barrels, etc., should also be treated with a film of kerosene oil.

In fact, every available means should be adopted to free the camp site and its immediate surroundings from the pest of mosquitoes by destroying the insects, their larvæ, and breeding places, meanwhile protecting malarial cases from being bitten, that the local insects may not become infected, and protecting healthy men, that they may not have the germs of disease implanted in them by mosquitoes that have already become pervaded with the malarial organism.

By command of Major-General Davis:

H. O. S. HEISTAND,

Colonel, Assistant Adjutant-General, Adjutant-General.

Contrary to a rather widely spread notion in this country, the native Filipino is not immune to malarial infection. He is apparently undisturbed by the attack of mosquitoes and does not exhibit paroxysms of malarial fever as intensely as the American, although even more frequently. In his case a toleration of the disease seems to be attained; not an immunity in any sense. Malarial fever is common among natives at certain times and places and is a large contributing factor to the native mortality of the islands. Examinations of the blood of native scouts have been made where practicable and the malarial organism found very frequently. First Lieut. James M. Phalen, assistant surgeon, U. S. Army, examined the blood of 70 members of the Seventh Company, Native Scouts, during the month of December, 1902, and demonstrated the organism in 18.5 per cent. The records of this company showed a high rate of sickness from malarial fever, but all these examinations were made upon men while doing full duty and at a time when none of them showed subjective symptoms. Based on this examination, the following circular was issued:

CIRCULAR }
No. 7. }

HEADQUARTERS THIRD BRIGADE, DEPARTMENT OF LUZON,

Batangas, P. I., March 2, 1903.

The following circular prepared by the chief surgeon for the information of medical officers is published for the guidance of all officers who will comply with the recommendations therein stated as to the compulsory use of mosquito bars:

"CIRCULAR.

HEADQUARTERS THIRD BRIGADE, DEPARTMENT OF LUZON,

"CHIEF SURGEON'S OFFICE,

"Batangas, Batangas, March 2, 1903.

"The following information is published for the guidance of medical officers serving with scouts at stations having no microscope:

"Systematic observations in one company of scouts have shown that 19 per cent of them had malarial organisms in their blood, and yet had never had any symptoms of disease whatever, the organisms apparently being harmless through racial immunity until there is a loss of resistance from some other disease or from exhaustion, when they may cause death suddenly. This corresponds with reports from Africa, that nearly all the natives harbor the germ, and, though unharmed thereby, they are a source of fatal infection to white men, who do not possess this racial immunity. So far as heard from, every case of white men harboring the germs in the superficial

circulation has shown symptoms sooner or later. You are therefore to consider all apparently healthy native soldiers as possible sources of fatal infection to whites, and are to recommend the use of mosquito bars to keep insects from carrying the disease. Native servants should not be allowed to sleep in barracks or quarters without the use of mosquito bars, for they are liable to infect the mosquitoes of that house. In one scout company reports show that no bars were used and the few men who had the disease infected most of the others, so that the company could not be called on for any field service without half of them being prostrated by malaria after a little work in a mosquito-free country.

"Though there are no definite data, it is suspected that a native infected with malaria, if in good health otherwise, will recover in time without medicine, on the general principle that reproduction in the mosquito is necessary for the germs, and that after a certain number of generations in the blood they so lose vitality as to be destroyed by natural defenses, and disappear unless constantly renewed by fresh infections. If this is true, all that is necessary for the protection of a scout command is the use of mosquito bars. The systematic use of quinin with them may be unnecessary except in those having symptoms. White men harboring the organisms must have prolonged systematic medical treatment, no matter how mild their symptoms. Neglect of this merely permits chronicity. Your attention is called to the benefits from the prolonged use of arsenic to saturation (Fowler's solution in increasing doses) in all chronic cases which resist quinin. Some chronic invalids reported have not had this tried, whereas their services might now be available.

"Any exact data on the topics which will clear up disputed points and lead to greater efficiency of troops must be reported.

"CHARLES E. WOODRUFF,

"Major, Surgeon, U. S. Army, Chief Surgeon."

By order of Colonel Williams:

J. G. GALBRAITH,

Captain, First Cavalry, Acting Adjutant-General.

An interesting demonstration of how quickly a command may be seriously infected by malarial fever when on field duty was reported from Balayan, Batangas, by First Lieut. Paul S. Halloran, assistant surgeon, U. S. Army, December 24, 1902.

On December 1, 1902, 30 members of Troop C, First Cavalry, and 2 officers left this station on a hunting trip for five days to the Looc Peninsula, in the northern part of the province. The party arrived at the town of Looc on December 3, camped there that night and the following night. The town consists of about a dozen bamboo huts occupied by a detachment of the constabulary and about a dozen families. It is located in a valley surrounded by mountains, the whole country being thickly covered by vegetation and very thinly settled.

The members of the hunting party slept on the ground under shelter tents during their stay and were in no way protected from mosquitoes, which were present, but not to an annoying degree. The party returned to Balayan December 6, having spent the night of the 5th in Nasagbu.

On December 16, 6 men of this detachment reported at sick call with malarial fever, and in the next four days 11 more members of this hunting party were taken sick with malaria. I immediately began an investigation to determine the source of infection, and as all the cases from C Troop were among men who had been at Looc, I inquired of the native physician here regarding the health of that locality and was informed that at this season of the year it is very unhealthy, as malarial fever is very prevalent. The constabulary officer in charge of the detachment at Looc informs me that over one-half of his men are unfit for duty on account of malarial infection.

Beyond a doubt, the source of infection of the 17 cases of malaria appearing in C Troop within five days is to be traced to Looc, the length of time from date of probable infection to appearance of disease being from twelve to fourteen days.

A very rigid sanitary inspection of the barracks and grounds was made on the 17th, and, aside from slight overgrowth of weeds in rear of the barracks, everything was found in good order. To prevent the possible further infection by mosquitoes, the quarters were fumigated by burning sulphur in every room of the building, and upon the recommendation of the surgeon every man in the troop was given a daily morning dose of 400 mgms. of quinin sulphate. Every man is required to sleep under a mosquito bar, and it is the duty of the non-commissioned officer in charge of quarters to see that this order is carried out.

CONSUMPTION.

During the calendar year 354 cases were admitted, or a rate of 4.38 per thousand of strength. There were 196 discharges and 69 deaths, equivalent to a rate of 2.43 and 0.85, respectively. Troops in the Philippine Islands show the greatest prevalence, as the admission rate was there 5.08, compared with 3.85 in the United States and 2.75 in Cuba and Porto Rico.

No case of pulmonary tuberculosis is now treated at post hospitals in the United States if able to bear transportation to the general hospital at Fort Bayard, N. Mex., and as the commanding officer of a post is now authorized to order a patient to the hospital on the certificate of the surgeon of the post, consumptives are removed without delay from among well men and given every prospect for a cure by climate, generous diet, and open-air life.

LEPROSY.

Up to and including the year 1902 no case of this disease had ever been reported in the Army, but in January, 1903, the surgeon of a station on the Atlantic coast of the United States reported a case of tubercular leprosy, the patient being a soldier of nearly ten years service, who had not been to the Philippine Islands, and had served only eight weeks in Cuba in 1898.

First Lieut. Harry L. Gilchrist, assistant surgeon, U. S. Army, who was quite familiar with leprosy from his service on the health board of Manila during the military government, was immediately sent to investigate the case, and confirmed, beyond a doubt, the diagnosis already made. The patient was at once isolated and every precaution taken to prevent any possible communication of the disease. Later, Doctor Gilchrist was detailed as surgeon of the post, and arrived there May 2. He had been provided with a complete X-ray apparatus, both coil and static, and it was determined to make a full test of the value of X-ray treatment in leprosy.

The following notes on the case are taken from several interesting reports of Doctor Gilchrist, who took up the work with the greatest enthusiasm:

In April, 1899, the noticeable beginning of the present trouble became apparent in the form of a small nodule, or, as he expressed it, a wart appearing on the forehead just above the right eye, about one-quarter inch in diameter, slightly elevated, freely movable, and painless, following an attack of "chills and fever." No record could be obtained of blood examination having been made, and, although large doses of quinin were administered during these attacks, they were always discontinued, due to utter ineffectiveness.

The patient claims he has never seen a case of leprosy and denies having had sexual intercourse while in Cuba.

* * * * *

Upon examination the man appears to be in fair physical condition, well nourished, strong, and, with the exception of the nasal trouble, suffers no discomfort, and claims he is able to perform his duties with perfect ease. Heart and lungs, normal; liver, slightly enlarged; spleen, no noticeable enlargement; urine shows traces of sugar, no albumen and no casts.

Nodular eruptions or lepromata, varying in size from a small shot to a chestnut, but of irregular outline and shape, are present in large numbers upon the forehead and neck, with a scattering on the back, elbow, metacarpo-phalangeal joint right hand, thighs, buttocks, and dorsal surface of right foot. The nodules are the natural skin color, or a pale red, and in some instances, where they have partly disappeared, of a

dark-brown color; are firm to the touch, freely movable, devoid of hair, and painless. In the superciliary region they coalesce, forming patches of irregular outline and shape and producing great disfigurement. Upon the chin, cheeks, and neck smaller, isolated lepromata are found. The lips are somewhat thickened, the fleshy part of the nose broadened out, with a small ulcer of long standing on the lower left ala; the external part of both ears are greatly thickened and of a pale red color, showing signs of infiltration. Upon the back and buttocks are a few scattering, irregular, depressed scars, with either a dark ring surrounding or patches of scar tissue of various shapes and sizes. The cervical, axillary, epitrochlear, and inguinal glands are greatly enlarged and indurated.

* * * * *

Microscopical examination.—Blood, urine, and saliva, negative. Small nodules or lepromata were sliced off by a sharp scalpel from the forehead, chin, neck, knuckle, thigh, and foot. These were washed separately in distilled water, and from the raw cut surfaces smears were made on cover slips and by staining (as per method described below) large numbers of the bacilli were found scattered throughout the field. A small scab was secured from the nose, a dried nodule from the buttock, and a scraping from the nasal cavity, were macerated separately, and when stained revealed the presence of the bacilli in large numbers.

Method of staining.—Removing the nodule from the distilled water, the pale glistening surface of the cut section was rubbed on the surface of a clean cover slip, the slip was then passed through the flame once for fixation. The smeared surface was then exposed to a seven-minute exposure of cold watery solution of carbol-fuchsin, when it was then treated with a 10 per cent acid alcohol (HNO_3) until the stain disappeared, and as a counter-stain an aqueous solution of methylene blue was used without heat after fixing.

Histological examination of specimen.—A nodule removed from the chin presented the following to the naked eye: The tissue has a grayish or yellowish, semitransparent, homogenous appearance, which hardened, mounted in celloidion, cut, stained, decolorized, and examined under the microscope was found to consist of fibrous tissue with large numbers of lepra bacilli scattered throughout the field, some single and again in masses. The most prominent objects to be seen were numerous large granular vacuolated cell-like masses, the vacuoles containing large masses of the lepra bacilli, also small round cells, and epithelioid cells, most of which showed the presence of the organism, in some but a few in number, in others the cell seems to be a packed mass of them. A few scattering giant cells were observed containing the bacilli.

Several nodules, smearings from which revealed the presence of the bacilli, were turned over to Dr. Carroll at the Army Medical Museum, who hardened and mounted them in paraffin and submitted the accompanying report.

* * * * *

Report of First Lieut. James Carroll, assistant surgeon, curator, Army Medical Museum.

The portions received were from several cutaneous nodules and a crust from the margin of the left nostril. The tissues were removed by incisions made parallel with the surface, and with the exception of the crust were about 8 mm. broad by 2 or 3 mm. thick. The microscopical sections were made at right angles to the surface. On account of the presence of calcareous material or of hardened epithelium one of the pieces could not be cut.

The most typical picture was obtained in a piece removed from the surface of a nodule situated on the back of the neck. Stained with hematoxylin and eosin this was seen to contain several typical giant cells and consisted almost wholly of a mass of proliferated connective tissue in the form of epithelioid cells, fibroblasts, and cells with large embryonic nuclei, whose general characters could not be easily determined. Some newly-formed capillaries could be made out and there was a moderate amount of intercellular substance. The covering layer of epithelium is unbroken and appears to be slightly compressed. If the origin of the specimen were not known it could be readily mistaken for a fibro-sarcoma, which it closely resembles throughout. There is no tendency to the formation of nodular areas such as are seen in tuberculosis, but there appears to be a general proliferation of the cells, many of which are embryonic in type. There are also newly formed capillary blood vessels.

When stained with gentian violet and Bismarck brown, one field shows three large typical giant cells crowded with slender bacilli.

Throughout the section bacilli occur in large numbers in the protoplasm of the

larger cells, both of the round and fusiform types, the latter occasionally, but not often, forming the walls of the blood vessels. The bacilli are found in close relation to the lymph spaces and lymphatics, and the proliferative activity appears to be due to the presence of the bacilli in the cells forming the perivascular lymphatics. Active multiplication of the bacilli has taken place in the protoplasm of many of these cells, some of which show solidly stained compact masses of the bacilli. In one rather large lymphatic the bacilli are plainly seen in the cells forming its wall and also in the endothelial cells lining the lumen. In some sections stained with carbol-fuchsin cold for two or three minutes, decolorized with 5 per cent nitric-acid alcohol, and then counter stained with methylene blue the bacilli are much more conspicuous and are found in enormous numbers.

The crust removed from the nostril shows the corium and epidermis, the latter broken in places and containing in the fissures masses of cornified surface epithelial cells. The corium is the seat of proliferative inflammation with the formation of one or two small nodules similar in size and form to tubercles, but differing from these somewhat in structure. One is quite circular in outline and is composed of epithelioid and embryonic cells with a small amount of intercellular substance, but there are very few lymphoid cells and no sign of caseation. It is traversed at the center by a newly-formed capillary. These nodules differ from tubercles in the absence of central caseation, the presence of capillary blood vessels, and the scarcity of lymphoid cells.

Bacilli are also found in these sections, but in smaller numbers than in the sections from the surfaces of the unbroken nodules.

No further description is necessary. The peculiar granulomatous or proliferative inflammation, the presence of newly-formed capillaries, and of bacilli in enormous numbers which correspond to the tubercle bacillus in form but are brightly stained by a method that will not affect that organism, the absence of caseation, and the small number of lymphoid cells present, all confirm, in the strongest manner, the diagnosis of leprosy.

* * * * *

I arrived at this post on the morning of May 2, 1903, and examined the patient thoroughly on the afternoon of the same day and found as follows: General condition fair, appearance about the same as when seen before, which was the early part of the year, temperature $101\frac{1}{4}$, respiration 20, pulse 95, heart and lungs normal, liver and spleen slightly enlarged, nodular eruptions of the skin all over the face and neck, a scattering on the back, chest, shoulders, elbows and extensor surfaces of the lower limbs, the nodules ranging in size from a small shot to a good-sized marble and of a dark red or a brownish red or slate color, exhibiting a waxy-like polish, some soft, others very hard, and the different nodules exhibiting different degrees of anaesthesia, anaesthesia appearing since seeing the case the first time. The forehead was quite prominent and thickened, caused by the large number of nodules and infiltrations, between which were deep furrows, eyebrows had entirely disappeared, the cheeks, lip, and chin were also affected in like manner; the nose very prominent, being quite broad and swollen, and the nostrils nearly occluded from the nodular infiltration. Upon the lower left ala was a running sore or ulcer from which a foul-smelling discharge was constantly given off. The lymphatic glands all over the body were greatly enlarged, especially the submaxillary, cervical, and groin glands. The patient claimed that during the past three months he had experienced peculiar feelings of a painful character throughout the body, sometimes in the head, again extending down through the limbs; sometimes being of such a severe nature as to interfere with his rest at night. Microscopical examinations were made from the cut surfaces of nodules removed from different parts of the body, also from the nostrils and from the discharge from the ulcer on the nose, and in all cases large masses of the lepra bacilli were found. The blood, saliva, urine, and feces were examined in a like manner with negative results; examinations made of sweepings from his quarters, and flies and mosquitoes caught there revealed nothing.

Apparatus used in treatment.—The induction coil and the static machines are used in connection with this work, the coil being of the Queen type M and capable of giving a 15-inch spark, with two interrupters—an independent vibrator and a mercury turbine. The static machine used in the treatment of this case is an apparatus of the Holtz type with 16 revolving glass plates 32 inches in diameter, the so-called Morton-Wimhurst-Holtz influence machine.

The electrical power, which is the direct current, used for the purpose of exciting and propelling these machines, is obtained from a 110-volt dynamo operated by an 11-horsepower oil engine. A small $\frac{1}{4}$ -horsepower motor is utilized to run the static machine.

The Mueller tubes used with the static machine are three in number, and according to Alher's classifications are "medium soft," capable of giving a gray-black detail of the skeleton, and "hard," capable of giving a gray one (corresponding to a spark gap of from 2 to 5 inches), also hard tubes capable of giving a good fluoroscopic outline of the skeleton of an average man at 22 inches. The Queen self-regulating tube is used exclusively with the coil machine, and thus far has proven highly satisfactory, because the degree of vacuum is completely under control.

In the treatment of this case different nodules have been subjected to exposures from tubes of different degrees of hardness and at various distances from the anode to the skin.

From what experience I have had thus far with X-rays, I have adopted as a routine measure an exposure of from fifteen to twenty minutes to rays excited by a static machine using medium tubes, and from ten to fifteen minutes with the coil, the distance from the anode to the patient's skin with the coil being greater than with the static machine. The length of exposure, however, is, of course, dependent upon the quality of the rays, the distance of the anode from the exposed surface, and the frequency of the treatment.

Due to the delay in receiving the apparatus, the time consumed in setting it up, and other minor delays, such as caused by the grounding of the dynamo, etc., actual treatment was not commenced until May 19.

Treatment.—Before the patient leaves his quarters, which are situated about 75 feet to the rear of the hospital, he is required to wash his hair, face, neck, and limbs with hot water and soap, and, after drying, rinses the parts with a weak bichloride solution. Just before he enters the hospital he puts on a long gown with hood attachment; he is then conducted to the X-ray room, where the treatment is given. Upon leaving the building the room is thoroughly aired and disinfected, the chair and things he comes in contact with are washed with a strong solution of bichloride, and the gown is removed at the outer door and immediately immersed in a solution of bichloride (1 to 4,000) for six hours. As the exposures are all localized, the surrounding parts are protected by shields of sheet lead, of which several thicknesses are on hand. These shields have a diaphragm or opening of sufficient size through which the rays reach the diseased parts.

As this is one of the first cases of leprosy ever treated by X-rays, and the effect of the light upon the nodules and the idiosyncrasy of the patient toward this kind of treatment were not known, great precautions were observed to prevent burning. The treatment was commenced on May 19, the middle knuckle of the right hand and the right ear being selected for this purpose, partly because these nodules were in a desirable place to treat and partly because they were of the most prominent on the body. Before treatment was commenced microscopical examinations were made from cut scrapings of each, and masses of the bacilli were found. The static machine was used to energize the tubes for the first few times and later on the coil. The left ear was next attacked, this being treated in a similar manner and with the same technique. The chin, nose, both cheeks, and forehead were then begun on, the technique in all cases being about the same. In the case of the nose and right ear slight burns were experienced, but of such a superficial nature that no bad effect followed.

No changes in the nodules were noticed in most cases until from seven to ten exposures had been given, when a slight dermatitis would appear to the extent of exfoliation of the epidermis and with serous effusion, which examined microscopically revealed large numbers of lepra bacilli. In all cases this dermatitis would not last over four or six days, leaving the skin a dark brown or tan color, the tan extending over the surrounding area. The condition of the skin over these areas would also undergo great changes, where it was firm, tight, and very much on the stretch and of a glistening appearance before exposure to the rays, it would become loose, the shiny appearance disappear, and in many cases wrinkles form over the exposed surfaces.

That many of the smaller nodules have disappeared and the larger ones are decreasing in size there can be no doubt, this being apparent not only to the patient and myself, but to all who have seen the case, and where the nodules were of a hard and firm consistency and without any feeling they have been rendered soft, pliable, and freely movable, and in most cases anaesthesia has about subsided.

Until the past few days in has been almost impossible for the patient to shave himself without frequently removing the razor from his face, due to the number and size of the nodules, but at present he is experiencing none of these difficulties and can now shave without removing the razor for a single nodule.

The patient had a continuous elevation of temperature ranging from $99\frac{1}{2}$ to $101\frac{1}{2}$, and this subsided several days after the X-ray treatment was commenced. As no medicines were administered during this time, it seems more than probable that

the lowering of the temperature was due to the treatment, also with the lowering of the temperature the pains and sleepless nights ceased, and at present the patient is enjoying the best of health, and, as he expresses it, he never felt better in his life.

While it is too early to form definite and sweeping conclusions regarding the value of the X-rays in the treatment of leprosy, the results thus far obtained look decidedly favorable, although it is not yet possible to give a prognosis as to the outcome of this particular case.

BERI-BERI.

This disease caused 626 admissions, equal to 7.75 per thousand of strength, a rate for the whole Army larger than that of typhoid fever. All cases originated in the Pacific islands and nearly all among Philippine Scouts. There were 23 cases and 2 deaths among white troops, 5 cases with 1 death among colored, and 598 cases with 29 deaths among Filipino soldiers.

It appears that this puzzling disease will be a very decided factor in the morbidity and mortality of our Malay troops, and will but slightly affect the American-born soldier.

Col. Charles Smart, assistant surgeon-general, the chief surgeon of the Division of the Philippines, reports as follows:

During the past year several of the companies of Philippine Scouts suffered severely from beri-beri. The disease prevailed extensively among the native troops at Laguan, Samar, in August, 1902; in Iloilo in September and October, and at Cauayan, Isabela, in 1903.

Most of our medical officers attribute the onset of the disease to a defective dietary in which there is an excess of carbohydrates in the form of rice and a deficiency of proteids, and recommend that the rice allowance be lessened, the use of wheat bread and corn meal encouraged, and the allowance of meat and beans be increased. Many consider rice to be the main factor in the causation of the disease, and in the diet of those affected this cereal is usually excluded; but this view can hardly be accepted in view of the many rice-eating people who escape the disease. Some medical officers have therefore fallen back on the assumption that the disease is due to the use of rice that has become mouldy or damaged by changes that have occurred during transportation in damp ships or storage in damp houses, but the damaged condition of the rice used prior to an outbreak of the disease has not been demonstrated.

The Thirty-ninth and Forty-fourth Companies of Philippine Scouts were the sufferers at Iloilo. The commanding officer of the latter company states that for a year the health of his men was excellent and no case of beri-beri occurred among them. Owing to the prevalence of cholera in the neighborhood, communication with the markets was interdicted and this quarantine cut off the supply of vegetables, restricting the command to a diet of rice and meat. In the third week of the quarantine the first case of beri-beri occurred, and soon afterwards one-third of the company was affected. It would seem, therefore, that the disease was possibly not caused by the rice, but by the want of fresh vegetables that had heretofore been associated with it. The company was shortly afterwards moved to Guimaras.

It seems, however, that rice, if a factor at all in the production of the disease, is less powerful than a specific infection of the locality. The disease does not appear to be infectious from man to man, but to spread among the membership of a command because all are exposed to a morbid influence existing in the locality. This is shown by the effect which a removal to a new locality has in checking the further spread of the disease, and the more rapid recovery of those who are already affected.

The latest endemic which illustrates this position occurred in March, 1903, in the Twenty-seventh Company of Philippine Scouts, stationed at Cauayan, Isabela. The disease was believed to have been brought to the post by the company. The company was sent to Tumauni, Isabela, and shortly afterwards the disease was shaken off. The successor of this company at Cauayan was the Twenty-eighth Company. The barracks were new, isolated, and situated on high ground, constructed of bamboo and nipa, with a split palma brava floor, 150 by 25 by 18 feet. The only fault in this building was that the subfloor space was too small, the floor in parts of the building being no more than 13 inches from the surface of the ground. The hospital building, about three-quarters of a mile distant from the barracks, was constructed of stone and wood, of two stories, the upper used as a ward for the sick. The troops were getting the full native ration and drew flour in preference to rice; the water

supply was boiled; the men were engaged in garrison duty only; mosquito bars were used by all. The post surgeon was unable to discover any case of beri-beri among the natives in the neighborhood, but during the month of March 33 cases were recorded on the monthly report of sick and wounded. Many of the cases sent to the post hospital improved rapidly, but immediately fell sick again on their return to quarters. All the cases were sent to the station hospital at Tuguegarao, Cagayan, during the month, and the company abandoned the post of Cauayan on April 1. As soon as the sick left the post the improvement in their condition was so marked that only 23 of them were taken on sick report at Tuguegarao. Of these, 19 were returned to duty during the first half of the month of April, and only 4 remained under treatment on the last day of the month.

The following concerning beri-beri is from the report of a board of officers appointed by paragraph 5, Special Orders 297, Headquarters Division of the Philippines, December 4, 1902, Brig. Gen. Theodore J. Wint, U. S. Army, president, to investigate and report upon surra and other tropical diseases of horses and mules, and to examine into and report upon various subjects pertaining to military administration in India, Burma, and Java. The report is dated Manila, P. I., June 8, 1903:

"Beri-beri prevails endemically in India, Burma, and the whole of the Malayan peninsula, though there had been no case in that portion of India or Burma visited by the board amongst the troops in several years, nor had the medical officers now stationed at these garrisons had any experience with it. In Java, however, the board found the disease existed amongst the troops as epidemic. Great difficulty was experienced in eliciting the necessary information from the Dutch officials, who generally were unable to speak English. Dr. Fock, in charge of Base Hospital at Batavia, and a thesis by Dr. Bentley, furnish the following data:

"The causes of beri-beri are not generally understood. As a rule the number of admissions to hospital in rainy season is augmented. That certain length of residence in a prison was essential for its production, but as the disease developed, this period became more curtailed. That damp and moisture unquestionably were a strong auxiliary to the disease. That any influences which tend to depress or lower the vital or resisting powers of the system, impoverished the blood, etc., may be among the causes of the disease. That it was a very rare thing for a woman or a boy under twenty to be attacked with it. That it was very much more common amongst the natives than Europeans and a certain period of residence in an infected locality appears to be necessary for its production. Overcrowded and badly ventilated rooms, the condition of soil, physical exhaustion and mental depression are alleged predisposing causes."

"Dr. Bentley is of the opinion that the six agents chiefly considered in the production of beri-beri in recent times are diet, impure water, damp and moisture, exposure to cold, and great alterations of temperature and malaria.

"Further he states, that this disease is not caused by any particular diet is clearly proven by the fact that all classes of individuals are liable to contract it, natives or Europeans, whether under favorable or unfavorable circumstances as regards food. It has occurred to persons when exposed to its influences who have had the same diet all their lives, in free men who have had a choice of diet, in European officers as well as men, and in natives working on their own account living in quarters of their own selection. Yet the history and progress of the outbreak of the disease in the prison in Singapore in June, 1880, shows conclusively that the diet has been a factor in its production. That the most satisfactory results were obtained by largely increasing the amount of nitrogenous foods and decreasing the carbohydrates. In Java no rice is supplied the patients, but wheaten flour, steak, and a kind of black bean are the principal food furnished."

"The authorities there are of the opinion that while the diet has nothing to do with the cause of the disease, it is possible that its poverty in respects of its nitrogenous constituents may predispose the blood of the native soldiers to the reception of the poison, whatever the peculiarity of that virus may yet be discovered to be.

"Of the five causes mentioned above, Dr. Bentley is of the opinion that all may be eliminated as having any direct bearing on the disease, except 'damp and moisture' and 'exposure to cold.' Damp and moisture in the tropics being conditions synonymous with malaria, there being few instances where the two are not found together, for in well-drained districts malaria is almost absent. There can be little doubt that without these conditions (damp and moisture) the exciting cause of beri-beri could not exist, hence the authorities hold that this is a strong proof of the malarious origin of the disease. But as the presence of a parasite similar to malaria has not yet been discovered, this theory is purely speculative.

"Observations show that exposure to cold or night air may be the cause of bringing on an attack of beri-beri in those who are already in a low state of health, but

whether this could be brought about and a case of true beri-beri produced without the presence of the poison is a doubtful question.

"The board was informed by Dr. Fock that it was almost invariably true when the patients were sent to the Hill Hospital and a nitrogenous food supplied them, they began to improve immediately, and, provided they reached there when the disease was in its early stage, recovery in a few weeks was almost sure. Some, however, being attacked in remote districts, and the authorities being unable to transport them before some time elapsed, had fewer chances of recovery."

MALTA FEVER.

Three special reports of cases of Malta fever were received during the fiscal year, and as this disease may play an unexpectedly important part in the health statistics of the Army brief notes on each are here given:

Case I.—Lieut. W. De W., assistant surgeon, U. S. Army, sailed from Manila for San Francisco, October 1. He had not been in particularly good health for several weeks, but no specially suggestive symptoms are of record. On the voyage he suffered once or twice from short febrile attacks lasting a day or so, but not severe enough to induce him to take his temperature. A short attack at San Francisco and another while crossing the continent also occurred; in neither case was the temperature recorded. November 10 the patient entered the Army Medical School at Washington as a student officer, and during the first week in December, along with his class, began the study of the micrococcus melitensis in the laboratory and continued it during the month.

Near the end of the first week in January the patient began again to have fever, at first intermittent. A regular record of temperature was only begun on January 16 and continued until March 17, when he was sent South as a convalescent. From January 23 he was treated at the general hospital, Washington Barracks. Three distinct periods of comparatively high pyrexia (101° to 104° F.) were observed, from January 16 to 23, February 1 to 5, and March 3 to 6. Between these exacerbations the temperature was normal or below in the morning and from $\frac{1}{2}^{\circ}$ to 2° above in the evening. Malarial parasites were repeatedly sought for and never found, but the serum test with the micrococcus of Malta fever gave positive results in dilutions from 1 to 50 to as high as 1 to 250. It is most probable that this case was due to self-infection in the laboratory of the school in December, but it is not altogether impossible that the patient had Malta fever before leaving Manila, which, if true, indicates a duration of six months or over in this case. Other symptoms were profuse sweating, irregular chills, and sleeplessness.

Case II.—Sergeant F. J. R., Fourth Infantry, was transferred December 14, 1902, to Fort Sam Houston, Tex., from Fort Ringgold, for observation and treatment, the diagnosis being chronic malarial fever and cachexia, with chronic muscular rheumatism. From June, 1899, to June, 1900, he had suffered from fever and rheumatism following service in the Philippine Islands, and was treated several months at Hot Springs, Ark. He then remained well until August, 1902, when the present attack evidently began, lasting at Fort Ringgold, Tex., and Fort Sam Houston, Tex., until January 3, 1903. Symptoms were irregular fever, more or less continuous, sciatica, pain in shoulder and neck, and constipation. His blood was repeatedly examined for malarial organisms, and tested for agglutination by typhoid and paracolon bacilli, but the tests were always negative. Finally, a

specimen sent to the Army Medical Museum and tested with the Malta fever germ gave a positive reaction.

Case III.—Private A. N., Hospital Corps, U. S. Army, admitted to the general hospital at the Presidio, April 22, 1903. In 1901, in the Philippine Islands, had an attack of fever, diagnosed as malarial, lasting five weeks, and unaffected by quinin. He did not feel well after this attack for a long time, but had pain in joints and back at intervals until the present exacerbation, which began April 19, 1903, with a severe chill, headache, pain in back and knees. Examination of blood was negative for malarial parasites, but a positive reaction was obtained with the micrococcus of Malta fever, an agglutination finally occurring immediately upon adding the blood serum in dilutions as high as 1 in 500.

This was the only positive reaction in nine tests for Malta fever made at this hospital.

The symptoms of this fever are so obscure and clinically it so closely resembles irregular malarial and typhoid fevers, that a positive diagnosis seems impossible without the blood test.

BUBONIC PLAGUE.

Bubonic plague again made its appearance in Manila early in 1903, but no case has occurred among troops. The disease is almost entirely confined to the Chinese and Malay residents, the former race furnishing by far the greater number of cases. All possible measures were taken against the disease, which seems to be held in check.

INTESTINAL DISEASES.

A marked reduction in intestinal affections was recorded in 1902, although this class of diseases still remain among the very highest in admissions and mortality. There were in all 23,474 admissions, equivalent to a rate of 290.61 per thousand of strength, while in 1901 the figures were 28,918 cases, or 312.67 per thousand. The mortality was also reduced about one-third, being, in 1901, 3.64 per thousand, and in the past calendar year, 2.53, as may be seen in detail in the following tables:

WHOLE ARMY.

	Cases.		Discharges.		Deaths.	
	Number.	Ratio per 1,000.	Number.	Ratio per 1,000.	Number.	Ratio per 1,000.
Dysentery, acute.....	3,146	38.95	7	0.09	86	1.06
Dysentery, chronic.....	1,864	23.08	97	1.20	82	1.02
Diarrhea.....	17,083	211.48	14	.17	13	.16
Enteritis.....	1,113	13.78	4	.05	14	.17
Appendicitis.....	268	3.32	15	.19	10	.12
Total.....	23,474	290.61	137	1.70	205	2.53

UNITED STATES.

Dysentery, acute.....	202	5.08	1	0.03	2	0.05
Dysentery, chronic.....	417	10.49	63	1.59	10	.25
Diarrhea.....	3,590	90.34	9	.23	.....	.....
Enteritis.....	216	5.44	2	.05	2	.05
Appendicitis.....	133	3.35	11	.28	5	.13
Total.....	4,558	114.70	86	2.18	19	.48

PACIFIC ISLANDS.

	Cases.		Discharges.		Deaths.	
	Number.	Ratio per 1,000.	Number.	Ratio per 1,000.	Number.	Ratio per 1,000.
Dysentery, acute.....	2,928	77.53	6	0.16	84	2.22
Dysentery, chronic.....	1,442	38.18	33	.87	72	1.91
Diarrhea.....	13,309	352.39	5	.13	13	.34
Enteritis.....	893	23.64	2	.06	12	.32
Appendicitis.....	124	3.28	3	.08	5	.13
Total.....	18,696	495.02	49	1.29	186	4.92

CUBA AND PORTO RICO.

Dysentery, acute.....	16	4.89	.....	.....	.....	.....
Dysentery, chronic.....	5	1.53	1	0.31	.....	.....
Diarrhea.....	184	56.20	.....	.....	.....	.....
Enteritis.....	4	1.22	.....	.....	.....	.....
Appendicitis.....	11	3.36	1	.31	.....	.....
Total.....	220	67.20	2	.62	.....	.....

Reports received from the Manila hospitals and from the general hospital, Presidio of San Francisco, Cal., seem to indicate that the specific form of dysentery due to the bacillus of Shiga has been rare during the past year. Cases of chronic amebic and chronic catarrhal dysentery have been numerous and proved, as usual, most obstinate and discouraging to treat.

In April, 1903, First Lieut. Henry H. Rutherford, assistant surgeon, U. S. Army, stationed at the U. S. Army general hospital, Presidio of San Francisco, Cal., began the treatment of chronic dysentery, sprue, and chronic entero-colitis with pure olive oil, and in the short time since the method has been instituted very encouraging results have been obtained. From a paper accompanying the annual report of the commanding officer of the hospital for the fiscal year ending June 30, 1903, the following interesting description of the treatment and the results so far obtained is given:

Remarkable results have been obtained at this hospital from the use of pure olive oil in the treatment of chronic dysentery, and while as yet nothing is known as to the exact manner in which the oil acts in these cases, except that it is a cholagogue and a nutritive, the results speak for themselves. Moreover, from an understanding of the morbid anatomy of this class of cases, one can readily understand the futility of the attempted application of intestinal antiseptics in many cases which have been given such treatment, and from a comparison of the two treatments for a chronic wasting disease, whose pathology almost invariably involves the liver and frequently the kidneys, one is inclined to believe the oil, even if it possesses no other property than those above mentioned, to be the more rational.

At this hospital, where a very large majority of the cases treated come from the tropics, there have been admitted since June 30, 1902, a total of 3,426 cases, of which 1,124 were chronic dysentery, sprue, and entero-colitis, chronic, and of the 74 deaths from all cases during that time, 26 were from these conditions. Furthermore, from the fact that cases of chronic dysentery remain in hospital on an average of two months longer than any other cases, excepting chronic gunshot wounds and tuberculosis, and that when apparently cured and sent to duty they frequently return to the hospital with all of the original symptoms present, it is apparent that the duration of illness in this class of cases is by far greater than in that of any other.

The morbid anatomy and pathology of chronic dysentery have been made familiar by the writings of various authors, and, in general, may be briefly stated as follows: A process of inflammation, ulceration, necrosis, and abscess formation, in all stages of chronicity, of the mucosa and submucosa of the lower two-thirds of the large intestine in some cases extending into the smaller intestine, and even involving the stomach, accompanied by wasting and atrophy of the glands and of the muscular walls of the

entire tract. A very large percentage of all cases are complicated with, at first, chronic hyperemia of the liver, later, decided atrophy, and frequently with abscess formation in the organ. A considerable number of cases in addition are complicated with chronic nephritis.

Of the various organisms that may be concerned in this disease two only have been isolated as known causes, the ameba dysenteriae and bacillus of Shiga, which organisms, in the first instance (ameba), burrow deeply into the tissue, or, in the second (bacillus), in great numbers, become so deeply embedded in mucus and detritus along the tract as to make it all but impossible to reach them with applications of any of the intestinal antiseptics.

With this brief summary of the conditions to be coped with, it may be seen that, without as yet a specific, it is but natural that of the numerous treatments which have been advanced up to the present time no one has sufficiently established itself to warrant its adoption as the routine method. Hence, we learn that patients linger on, their condition vacillating between better and worse through months or years of time until some complication, liver abscess, chronic nephritis, etc., or some intercurrent disease brings the end.

The following medicinal methods in vogue for the treatment of chronic dysentery have been used more or less extensively in the service of this hospital: Irrigations by solutions of quinin sulphate, silver nitrate, mercury bichlorid, and hydrogen peroxid; enemata of turpentine, and bismuth subgallate in milk, or of tincture of opium and fluid extract of ipecac in water; internal treatment by bismuth, salol, and other drugs; tonic treatment by strychnin, iron, quinin, etc.

It will be observed that the use of most of these remedies is based upon their properties as antiseptic applications, ipecacuanha alone excepted; and it might be added that such treatment in the more chronic stages of the disease has been indicated solely on account of greater or less value in the acute and subacute stages.

It is obvious to one considering the pathology of the chronic amebic, as well as the specific types of dysentery, that high enemata of antiseptics of whatever strength can do no more than wash, and in some measure cleanse most superficially the lining of the colon. With these treatments, of course, are always combined a suitable dietary and needed tonics.

The cases treated to date with pure olive oil were 26 in number, as follows:

1. Diagnosis: Dysentery, chronic, catarrhal, complicated with chronic parenchymatous nephritis. Original admission: October 13, 1902. Oil treatment begun April 14, 1903. During six months, October 13, 1902, to April 14, 1903, this patient was treated successively by irrigation of 1 to 5,000 enemata quinin solution, 2 per cent peroxid injection (increased daily up to 10 per cent) combined nitrate of silver and intestinal antiseptics, ipecacuanha, and various internal treatments, including tonics. In this period his weight decreased from 116 to 90½ pounds, and his bowel movements increased to as many as 15 in twenty-four hours. Although put on a strictly liquid diet, his food passed practically unaffected by digestive processes.

This patient was placed on the olive-oil treatment April 14, 1903. Improvement in his general condition could be noticed in three days, and in one week his stools began to be formed. His recovery has been phenomenal, and in the two and one-half months he has been on the olive-oil treatment his weight has increased 69 pounds, the character and number of defecations being absolutely normal. He is able to take exercise and looks the picture of good health.

2. Diagnosis: Dysentery, chronic, amebic. Original admission: October 13, 1902. Oil treatment begun April 15, 1903. During the period October 13 to December 1, 1902, patient lost 14 pounds on the following treatments: Peroxid, 2 per cent; nitrate of silver, 1 to 1,000; quinin enemata, 1 to 5,000; bismuth subnitrate and bismuth, salol, and pepsin internally. After December 1, 1902, patient was put on nitrate of silver injections (0.001 per cent) daily. On January 10, 1903, he was given enemata and internally astringent pills, gaining on this treatment 9 pounds. Oil treatment instituted April 15, 1903, and he has since gained 13 pounds. His general health and condition are greatly improved and his feces are normal, although from time to time a small quantity of thick, pure mucus is passed at stool.

3. Diagnosis: Dysentery, chronic, amebic, recurring. Original admission: November 14, 1902. Oil treatment begun April 14, 1903; gained 16 pounds. The patient's nervous system is weak. If he remains in bed only a few days his feces become normal in quantity and quality, his weight increases and so does the number of red blood cells. After being up about ten days he drops back to where he was before, notwithstanding the fact that the treatment is persisted in. His red blood cells vary in a week as much as 1,000,000 per c. c. Although, taken as a whole, his condition has greatly improved, it can not be said that he is cured.

4. Diagnosis: Dysentery, chronic, catarrhal. Original admission: November 27,

1902. Oil treatment begun April 16, 1903. This man's bowels had improved before going on the oil treatment, but his nervous system, general condition, and character of feces improved so rapidly on olive oil that it could be noticed from day to day. During the five and one-half months, November 27, 1902, to April 16, 1903, the patient was treated thoroughly by the combined nitrate of silver and intestinal antiseptic treatment. The peroxid and the ipecac locally, salol and bismuth subgallate internally, together with tonics and strychnin. During the early part of the period the patient's general condition would improve slightly for several days and then relapse. His case became complicated by sprue, and for a period of two months his excreta were thick fluid in consistency, green in color, and frothy. No permanent improvement in the condition of the bowels took place until the oil treatment was instituted. During five and one-half months the patient gained 26 pounds, whereas, upon oil and nitrogenous diet he gained 43 pounds in one and three-quarter months, being able two weeks before discharge to do general fatigue work. So far as known no recurrence of the dysenteric symptoms have arisen.

5. Diagnosis: Dysentery, chronic, catarrhal, complicated with sprue and chronic parenchymatous nephritis. Original admission: November 29, 1902. Oil treatment begun May 11, 1903. The anemia and emaciation in this case were very marked. There is slow convalescence attributed to the complication of nephritis, rendering it impossible to give tissue-building diet, whereas the condition of the bowels prohibit the use of the carbohydrates. However, he has gained 13 pounds in weight and his general condition has improved.

6. Diagnosis: Dysentery, chronic, amebic. Original admission: December 23, 1902. Oil treatment begun April 15, 1903. The dysentery in this case had begun to improve when the patient was put on oil. However, an increase of the oil aggravated the disease so that it was necessary to restrict the diet to liquid and increase the dose of oil. The seventh day after the increase the patient went on nitrogenous diet and made an uninterrupted recovery. His gain in weight was not marked, but all the symptoms of dysentery had disappeared, and the improvement in his general appearance was very noticeable.

7. Diagnosis: Gastro-enteritis, chronic. Original admission: January 13, 1903. Oil treatment begun April 14, 1903. The patient from the time of admission seemed in very good physical condition, but the intestinal and nervous symptoms of dysentery remained. His excreta did not become normal, to remain such, until June 15, 1903. The oil improved the pathological conditions considerably, but did not materially increase patient's weight.

8. Diagnosis: Dysentery, chronic, catarrhal, complicated with anemia, acute, secondary to dysentery. Original admission: March 3, 1903. Oil treatment begun April 27, 1903. During the two months from March 3 to April 28, 1903, patient's weight increased $38\frac{1}{2}$ pounds (from 91 to 129 $\frac{1}{2}$) on the following treatments: Enemata of solution of peroxid of hydrogen, twice daily; pepto-mangan, bismuth, and tonics, internally. Diet nitrogenous. He was placed on the oil treatment April 27, 1903, and since that time has gained 9 $\frac{1}{2}$ pounds, up to about normal weight. His general appearance is excellent, but the pathological improvement has only been of a moderate degree. This case is the exception wherein tonics and local antiseptics have proved as efficient as the oil.

9. Diagnosis: Dysentery, chronic, catarrhal. Original admission: March 11, 1903. Oil treatment begun May 20, 1903. During the two months from March 11 to May 20, 1903, patient gained 7 pounds on the following treatment: Enemata of 5 per cent solution of peroxid of hydrogen and iron, quinin, and strychnin, internally. On account of the persistent gastric catarrh it has been necessary to place this patient on a strictly milk diet, which accounts for the loss in weight. The pathological condition improves from time to time, but recurs.

10. Diagnosis: Dysentery, chronic, amebic recurring, complicated with chronic malarial cachexia. Original admission: March 26, 1903. Oil treatment begun April 17, 1903. From April 17 to May 5, 1903, this patient gained $6\frac{1}{2}$ pounds, and stools became normal. On May 8 he suffered from considerable congestion of both liver and spleen, and after this time the oil seemed to have a detrimental effect, the patient's weight becoming less, and gastric digestion poor. However, on June 3 the excreta were normal, although a small quantity of purulent mucus was still passed in stool. The oil was stopped on June 5, and since that date the patient has gained slightly. From May 5 to 31 this patient lost 12 pounds, although taking oil. This loss is attributed to the malarial dyscrasia so prominent during this period.

11. Diagnosis: Dysentery, chronic, catarrhal. Original admission: April 3, 1903. Oil treatment begun April 14, 1903. This patient's general condition improved slowly from the time the oil was begun. The dejecta were practically normal upon admission, but the intestines were more or less irritable and so continued until the last ten days of the treatment, when they became normal and remained so.

12. Diagnosis: Dysentery, chronic, amebic. Original admission: April 3, 1903. Oil treatment begun April 16, 1903. Upon admission this patient's digestive apparatus was apparently in fairly good condition. However, he suffered principally from impoverishment of the entire physical economy. His intestines were especially weak and circulation was very poor. He gained $25\frac{1}{2}$ pounds in five and one-half weeks, and during this time the character of his excreta, as well as his general appearance, were greatly improved.

13. Diagnosis: Dysentery, chronic, amebic. Original admission: April 3, 1903. Oil treatment begun May 14, 1903. The condition of this man's intestines had improved considerably when admitted, although they did not become normal until nearly six weeks later. The prominent symptoms at time of admission were nervous depression, anorexia, and poor digestion. He gained $6\frac{1}{2}$ pounds during the first week and steadily improved to date of discharge, gaining in weight $33\frac{1}{2}$ pounds in a little over two months, and his general appearance was excellent.

14. Diagnosis: Gastro-enteritis, chronic, catarrhal, complicated with appendicitis, chronic, catarrhal and ischio-rectal abscess, left. Original admission: April 7, 1903. Oil treatment begun April 14, 1903. Upon admission this patient was 25 pounds under weight, very nervous, suffering from indigestion, chronic catarrhal appendicitis and incipient ischio-rectal abscess. He suffered for some months upon admission with gastro-enterocolitis. The administration of oil was begun, and his weight increased in three days. His excreta showed mucus on one occasion only thereafter, April 28, 1903, and the symptoms of appendicitis entirely disappeared. His excreta was entirely normal after April 30, 1903, and he gained $28\frac{1}{2}$ pounds in thirty-two days. On May 12, 1903, the symptoms of ischio-rectal abscess recurred, and he was transferred to the surgical ward for operation.

15. Diagnosis: Dysentery, chronic, amebic. Original admission: April 25, 1903. Oil treatment begun May 20, 1903. The severe symptoms of dysentery had almost entirely disappeared when the oil treatment was begun. However, a chronic catarrhal condition of the colon still existed. Under oil, his general condition improved and his excreta became normal May 24, 1903, and so continued thereafter.

16. Diagnosis: Dysentery, chronic, amebic. Original admission: April 28, 1903. Oil treatment begun June 8, 1903. General condition improved. Gain in weight slight, only 6 pounds in three weeks. The patient's slow convalescence was attributed to tobacco, his nervous system being overcharged with poison resulting from excessive smoking.

17. Diagnosis: Dysentery, chronic, type undetermined. Original admission: April 28, 1903. Oil treatment begun May 1, 1903. Extremely emaciated and very anemic. Feces at present nearly normal, a little soft. Gain on oil, 31 pounds in two months.

18. Diagnosis: Dysentery, chronic, amebic. Original admission: April 28, 1903. Oil treatment begun May 3, 1903. Although this patient has not increased in weight to any great extent, his dejecta have become normal, and his general condition has greatly improved. It is very probable that larger doses of oil would have increased his weight more rapidly.

19. Diagnosis: Dysentery, chronic, catarrhal. Original admission: April 30, 1903. Oil treatment begun May 1, 1903. This man was much emaciated and debilitated. His excreta are now normal, and he has gained $45\frac{1}{2}$ pounds in two months. His face has changed from a muddy, pinched condition to the full flush of healthy youth.

20. Diagnosis: Gastro-enteritis, chronic. Original admission: April 30, 1903. Oil treatment begun May 1, 1903. This man was markedly emaciated and very anemic. He has improved considerably, gaining 32 pounds in two months, this notwithstanding his debilitated condition on admission.

21. Diagnosis: Dysentery, chronic, amebic. Original admission: May 21, 1903. Oil treatment begun May 25, 1903. Although no amebæ were found here, patient gives a typical history. He was put on 30 c. c. of oil upon his arrival, but this amount stimulated flow of bile, causing vomiting. After six days, dose reduced and gradually raised to 90 c. c. of oil t. i. d. Gained in one month $18\frac{1}{2}$ pounds, feces practically normal, and general condition greatly improved.

22. Diagnosis: Dysentery, chronic, amebic. Original admission; May 21, 1903. Oil treatment begun May 21, 1903. This man improved markedly until June 6, when chronic parenchymatous nephritis developed, and on milk diet he went down to 110 pounds. During the last week he has gained $6\frac{1}{2}$ pounds; the condition of his stools and general appearance greatly improved.

23. Diagnosis: Dysentery, chronic, amebic. Original admission: June 2, 1903. Oil treatment begun June 7, 1903. The improvement in this case has progressed slowly, attributed to complication of severe alveolar abscess. However, there is a slight improvement in the condition of his excreta and a noticeable improvement in his general condition.

24. Diagnosis: Dysentery, type undetermined. Original admission: June 5, 1903. Oil treatment begun June 5, 1903. This man is well nourished and is not anemic, but the condition of his intestines has not materially improved.

25. Diagnosis: Dysentery, chronic, type undetermined. Original admission: June 6, 1903. Oil treatment begun June 8, 1903. This man's improvement has been slow, but both the general condition and that of the intestines have progressed very favorably, considering that his physical condition was very poor when admitted. A gain of 12½ pounds in twenty-four days has resulted.

26. Diagnosis: Gastro-enteritis, chronic. Original admission: June 13, 1903. Oil treatment begun June 13, 1903. On admission emaciated and slightly anemic, due to inability to properly assimilate food. After ten days the excreta became normal and no relapse has occurred. He exceeded all others in gaining weight during a short space of time, having gained over 12 pounds in four days. The total weight gained is 23 pounds in seventeen days.

The results obtained in the above summarized cases are, beyond question, superior to any heretofore observed in this hospital.

First. In that the general improvement has been constant and marked in every uncomplicated case, there having been as yet no relapse.

Second. Symptoms of hepatitis have disappeared in those cases in which they had previously been noted, and abscess of the liver has not as yet been found to develop in a single case.

The rationale of pure olive oil in this treatment is believed to be as follows:

It is cleansing, lubricating, and soothing to the inflamed mucous lining of the gastro-intestinal tract. It absorbs and removes mucus, detritus, and irritable gases, and so allays fermentation and irritation. It acts specifically on the liver through the portal system, stimulating that organ, which in the chronic cases of this disease is generally atrophied, and largely increases the flow of watery bile, a natural intestinal antiseptic and antifermentative. By stimulating and cleansing the liver and the intestinal tract it decreases the amount of toxins absorbed, relieves the kidneys of their added work, and in this manner clears the way for the entire organism to react from a state of inanition and over-intoxication.

Lastly, being the most easily digested of all oils, it is a most desirable heat-producing food for a combined diet in this class of cases.

Method of administration.—It is found in most cases that until the patient acquires a tolerance for the oil it is best taken with about equal quantities of hot milk. Cold oil and hot milk being of about the same specific gravity will, for a short time (one-half minute), so perfectly mix as to practically form an emulsion. Later on, without an exception, it is found that the patients acquire a relish and can take oil in any reasonable quantities at least four times a day. The oil is given about one hour before meal time in quantities of from 30 to 90 c. c., this in order to get the maximum effect on the empty stomach, intestines, and liver. The oil must be pure, virgin olive oil, and the California product has been found more desirable than the imported oils.

It has been noted in a number of the cases above given, though the significance of the fact can not as yet be determined, that numerous amebæ have developed in the feces of chronic cases, who have been lingering for some months, with but slight, if any, improvement in their condition, and who, so far as had been determined here, had not during that time shown the presence of the organisms.

ASIATIC CHOLERA.

Cholera in the Philippines in 1902 caused for the whole Army an admission rate of 6 per thousand of strength and a death rate of 3.54. For the force serving in the Pacific islands, which alone was exposed, the admission rate was 12.84 and the death rate 7.57 per thousand. The total number of cases was 485 and the deaths 286, a proportion of 1 death to 1.69 cases.

This terrible disease had not appeared among our troops for thirty-six years, when it caused in 1866 the sickness of 2,813 men, of whom 1,269 died. For troops exposed there were 211.9 admissions per thousand and 94.4 deaths, and again in 1867 there were 71 admissions and 32 deaths per thousand for all exposed troops. The malignancy of the disease was not as great in those years as in the present Philippine epidemic, for in 1866 1 death occurred to 2.22 cases and in 1867

1 death to 2.19 cases. When it is considered that in 1902 nearly half of the mean strength of the Army was serving in a tropical country with cholera everywhere prevailing, and that the native population showed during the same year a total (probably underestimated) number of 128,000 cases with 81,500 deaths from cholera, the great value of preventive measures based on more perfect knowledge of the disease is very evident.

The sickness and mortality among troops at the most cholera-stricken stations in the Philippines in no case approached the figures reported from the Kansas posts in 1867. At Fort Harker, for instance, out of 378 strength, white and colored, there were 43 cases and 30 deaths, while out of about 400 colored troops en route from Fort Harker to New Mexico 75 cases and 27 deaths took place. At Forts Hays and Wallace the rates were also enormous, and even at Governors Island, N. Y., out of 860 soldiers 35 acquired the disease and 18 died.

When cholera first made its appearance in Manila in March, 1902, the insular board of health, which is also the health board for the city, was fully organized. Provincial and municipal boards had been provided for, but the lack of competent civil physicians rendered their organization far from complete. In Manila the division commander was called upon for medical officers, and all that could be spared were detailed to sanitary work in the city. Many medical officers under orders to return to the United States were detained in Manila for this purpose. An attempt to confine the disease to the Farola district, where cholera had first appeared, was made and the district burned over; but when it was found that the disease was widely spread through the city such radical measures were abandoned and reliance placed on disinfection and general sanitation. The enormous part taken by the medical officers of the Army in the fight against cholera in Manila, to say nothing of their work in the provinces, where in most cases the whole burden fell upon their shoulders, has not yet been adequately recognized. By house to house inspection night and day, strict supervision of markets, protection of the water supply from the Mariquina River, closure of wells, and provision as far as possible of distilled water to the people, the epidemic was fought steadily in the face of opposition and even hostility, not only of the ignorant but of those who by education should have been assistants rather than obstructionists. The value of the sanitary work in Manila is very apparent when the sick rates from cholera are compared with some of the provincial towns where nothing could be done to check the disease.

The spread of cholera into the provinces was not long delayed. Before the end of March it had appeared in Bulacan, Cavite, and Bataan; in April it spread extensively in Luzon, and by the end of May it was reported from other islands.

Notwithstanding the timely warnings sent out from the headquarters of the division, the ample information from the office of the chief surgeon, and the strictest regulations as to quarantine and sanitation, the disease spread in all directions from Manila. In towns garrisoned by United States troops the medical and line officers strained every nerve to protect their commands, the native population of the towns, and, as far as possible, outlying barrios, by keeping out infection and preventing the spread of disease once introduced. The history of all cholera epidemics shows the impossibility of maintaining effective land quar-

antine, and the ease of communication between islands in the Philippine Archipelago by small craft renders marine quarantine there almost as imperfect. It is not surprising, therefore, that cholera spread by both land and sea. In a large proportion of towns the first recognized case of the disease occurred in a patient arriving from some infected point, and usually dying within a few hours. How many times the persons introducing the disease in a community were mild cases, and therefore unreported, will never be known, for the possibility of the cholera vibrio being conveyed from place to place by an apparently well person and being discharged in his evacuations is recognized. Very often the first case appeared in an outlying barrio where close supervision was impossible. The native officials have generally proved apathetic, if not actively hostile, to all sanitary measures undertaken by the authorities. Native quarantine guards and inspectors were nearly always inefficient. The people superstitious and fatalistic, suspicious of Americans, and probably feeling keenly the necessary restrictions of quarantine and detention, the interference with the sale of fruit and vegetables and the general disturbance of their small commerce between town and town, formed the worst possible foundation for sanitary work, to say nothing of their well-known unhygienic surroundings and mode of living.

The means adopted to stamp out the disease when introduced were theoretically perfect. By General Orders, No. 66, Headquarters Division of the Philippines, March 25, 1902, the sanitation of all provincial towns was intrusted to the medical officers of the division, who were announced as members of boards of health, where such existed, and ordered to constitute boards where there were none. The towns were divided into districts, inspectors and sub-inspectors appointed, every case of sickness and every death were ordered reported and received investigation, and restrictions placed on the sale of fruit and green vegetables. Sanitation of premises was carried out as far as possible. The people were instructed in the nature of the disease and the means of prevention in as simple words as possible. Where practicable distilled water was furnished to all, otherwise orders to boil all drinking water were issued and public boiling stations established. With an intelligent population, willing to cooperate for the public good, these measures would undoubtedly have met with the success they deserved, but ignorance, superstition, and untrustworthiness are not to be overcome in a few days or weeks. Cases were not reported, deaths were concealed, and the bodies buried surreptitiously or thrown in rivers. Restrictions as to water and food were violated whenever possible. Visiting between towns by unauthorized persons was never effectually checked. Where the roads were properly guarded the natives traveled by back trails in the mountains; every by-path became a channel by which the disease was extended. Nevertheless, the civil sanitary work so cheerfully assumed by the medical officers saved hundreds of lives and appreciably checked the epidemic in garrisoned towns. Where no troops were stationed the disease spread unresisted. Thus on the Isla de Verde, in Batangas Bay, out of a population of 2,500, between May 25 and June 23, 1902, 409 cases with 250 deaths occurred. The place was ungarrisoned, but as much assistance as possible was afforded from Batangas when the epidemic was reported. At Batangas, 12 miles away, with a population of 12,000, only 125

cases occurred in the pueblo proper, the comparatively good result being attributed to the fact that earth closets were in general use and that distilled water was furnished from the ice plant.

Maj. A. L. Haines, surgeon, U. S. Volunteers, in a report from this station, dated September 24, 1902, says in part:

The first recognized cases were seen on an island in the bay of Batangas, called Isla de Verde, situated about 12 miles from this town. The disease made its appearance there about May 25, and between that date and June 23, 1902, when the epidemic was reported over—a little less than one month—there were reported 409 cases, with a mortality of 250, slightly over 61 per cent. The history of the source of the epidemic was that the cabeza of the principal barrio, San Augustan, had gone on a visit to Calapan, on the island of Mindoro, and on returning was taken sick and died the next morning, a few hours after arriving at his home. Cholera was then not known to exist on the island of Mindoro, but was subsequently reported as existing, and the official report of same showed for the first day 53 cases with 43 deaths. This offers reasonable grounds for believing that the disease had existed for some time before its presence was known, and is only another one of the many instances in which the natives concealed the existence of the disease from the authorities. There are good reasons for believing that the disease was transported from Manila to Calapan, Mindoro, probably by native boats, and from there to the island above named.

At this time water was very scarce on the island, and almost the entire population of about 2,500 came to the coast to get their drinking water, which was obtained from three wells situated in as many barrios. One of these wells was near the house where the cabeza died, and it is believed that the well became infected from throwing fecal matter or vomit in the vicinity. The epidemic spread rapidly from barrio to barrio until the entire island was involved, being more severe along the northern coast than anywhere else.

As soon as the existence of the epidemic on the Isla de Verde became known in the post, a launch was dispatched with a medical officer, having on board food and medicines and a native practicante. An investigation was made as to the nature of the disease and the means of its spreading. It was pronounced to be Asiatic cholera. The condition of the water supply was looked into and it was found that the water was drawn from shallow wells which were surrounded with animal and vegetable matter. The head men of the barrios were gotten together and instructed how to sterilize their drinking water and how to handle all food supplies in a cleanly manner. They were directed to erect plants for boiling water at their wells with large sugar kettles and ordered not to permit the use of any water for any purpose whatever that had not been so treated. The sick were seen as far as the limited time of the surgeon permitted, medicines administered, and a liberal supply left with the practicante who was instructed to visit all the barrios and attend the sick. A plentiful supply of rice and other provisions was left with the head men of each town, with instructions to make a proper distribution of the same. The entire island was placed in quarantine and every effort made to confine the disease to the island, but not with much success. The natives were in possession of large sailing bancas and continued to visit the barrios on the mainland of Luzon on the one side and Mindoro on the other, and even attempted to enter the river flowing through this town. Upon one occasion such a boat was intercepted at the mouth of the river by the inspector on guard at that point and upon examination was found to contain the bodies of two persons who had died during the night while en route to this town. Police guards were placed along the shore of this island at different barrios to prevent the landing of individuals from the infected island, but all such police supervision, owing to the indifference or the criminality of the native inspectors, was found to be futile. The barrios on the mainland soon afterward became infected and the infection spread along the coast of Luzon to the south of this town.

Subsequent visits were made to Isla de Verde by the post surgeon and every effort made to limit the spread of the infection and to alleviate the suffering of the unfortunate natives, but with little success, as shown by the figures given. The epidemic continued to run its course until its force was spent, either in becoming attenuated or by exhausting the susceptible material.

The next case of this class of sickness was discovered at a barrio named Tingi, situated about 6 miles from this town on the northeast, and on the road to Ibaan and Lipa. This was seen on June 7, 1902. This barrio had evidently become infected from Lipa or vicinity, where cholera had been previously reported, by natives traveling to this barrio from Lipa, or from the river water flowing from Lipa and which formed the main water supply for the barrio. Next a case was discovered in Batan-

gas proper in the person of a native associate of a teamster who had come from Lipa a few days before. On the 11th 2 cases were discovered in another barrio outside of this town to the north, and on the 14th 2 cases were seen at the barrio Santa Clara, situated on the beach near the place of landing.

In the town of Batangas proper there was a total of 125 cases among the natives, with a mortality of 87, or 69½ per cent. These statistics are fairly accurate, as it is believed that few if any cases escaped being reported by the inspectors, and all diagnoses were confirmed by a surgeon when so reported. This is a very small number for a population of 10,000 to 12,000, and is to be attributed, it is believed, to the fact that the dry-earth closet system was in quite general use during and previous to the epidemic, and to the use of sterile water supplied from the ice plant. These measures were adopted and enforced by the board of health at the time the military was in supreme authority in town. These cases were without doubt in part transported from adjacent infected towns by individuals becoming infected at such places and returning to this town, and subsequently developing the disease, and then, by their uncleanly personal habits and lack of proper house sanitation, infecting others through their food or water supply, and, in addition, some few cases were contracted from the river water which became infected and which some natives continued to make use of through ignorance or indifference, and in spite of all orders to the contrary. The figures given for the native cases outside of Batangas proper are not vouched for and yet they are probably as reliable as any to be had. The figures to be relied upon absolutely are those of the number of deaths. These statistics were always faithfully reported under Spanish times and the custom has still prevailed. The total number of cases in the barrios can only be estimated. The system of obtaining statistics was the best that could be employed, as it was impossible for a surgeon to be on duty in each of the forty-eight barrios attached to the town, many of them situated quite remotely from it. The plan adopted was to make the cabeza or head man responsible, report each day the number of cases to the inspector and practicante with the number of deaths. These reports came in daily and were consolidated. But in spite of these efforts many cases were concealed or not reported through the ignorance or indifference of the natives and native officials.

Taking the town proper as a basis, which shows 125 cases to 87 deaths, or about 70 per cent of deaths to the total number of cases, it would make the total number of cases in the barrios 1,167 to 817 deaths, but this is undoubtedly higher than the actual number of cases occurring. The death rate in the outside towns was very much greater, indeed must of necessity have been so, as it was impossible to give the sick in remote places the same attention and care that those in town received. I believe it safe to say that 75 per cent of the total number of cases occurring outside of the town died. This would make on that basis the total number of cases in the barrios about 1,089, which is probably not far from correct.

The soldiers of this command suffered very little from the epidemic, there being a total of 7 cases with 3 deaths, or 42½ per cent. These cases were the result in most instances of individual disobedience of post sanitary regulations. At least two of the seven cases were traced to a Chinese restaurant and saloon, and one case was contracted while on detached service. The quartermaster civilian employees furnished most of the cases occurring at this post among Americans, which offers another argument for placing the large number of these employees under military control and discipline. Those here may be said most truthfully to have been absolutely without discipline and to have known no restraint beyond their own personal desires. As a rule it made but little difference to them what military ordinances were adopted to guard the command from infection; such orders were not to be enforced over them nor was obedience a matter of principle. As a result teamsters continued to drink water from infected streams when on the march or when hauling supplies from town to town; and corral men continued to visit native shacks and presumably to partake of such refreshments as were offered. For illustration: 16 teamsters came overland from Lucena with their teams to take station at this post, and after reaching this town they furnished several well-developed cases of cholera, to in turn act as foci for new infection to the soldiers of the command. A number of the men acknowledged to me that they drank water from the streams along the route. A total of 16 cases developed among the quartermaster employees of this post, with 7 deaths.

No comparison can well be made between the native troops and the natives in general as to power of resistance to this disease and as to mortality, because of the vast difference between the native troops and the average native. The native troops are typical of the average native sick with cholera only in nationality. The death rate of the native troops from cholera is notably less than among the natives of the town, the one being 45 per cent and that of the other 70 per cent, although the same medica-

tion was given. It must necessarily always be so, even if we were able to treat and care for both after the same manner. The native soldier is a better example of vigor and health, being selected for this very vigor and strength; and then again, he has been liberally nourished by a selected course of regimen, while the native victims of cholera frequently represented children and the infirm who had, at least for months past, been nourished on a limited supply of rice and fish, and therefore had little resisting power. Again, it was impossible to carry out among the natives sick with the disease the careful system of medication and diet that was given the native soldiers, although treated after the same methods that were instituted in our own hospitals and with our own corps of nurses; hence the vast difference in death rate between the native soldiers and that of the native population.

* * * * *

The plan of management of the epidemic was that pursued in most places. A cholera hospital was established for the natives and one for the Americans. Attached to each was an observation tent or building where suspicious cases were placed until the diagnosis could be confirmed. At the native hospital a separate tent or house was erected for contacts. At first all native contacts were moved to these observation wards, but this plan was finally abandoned as it was found to be unnecessary and to entail a hardship on the natives.

Cholera is not any more contagious than typhoid fever, and where a second case developed it was not from contact with the sick, but with the infected material from such cases, or from the original source of infection. Hence, if the soiled clothing of the patients be destroyed and all vomited and excreted matter disinfected and the original infecting water or food excluded or rendered sterile, there is no excuse for a second case appearing. Exactly the same laws apply as in typhoid fever sanitation. The removal of contacts from houses was therefore discontinued and only the sick removed, while special attention was given to destroying all material about the patients, such as bedding, clothing, and disinfecting the room where the patient had lain and insisting that all household and kitchen utensils should be rendered sterile by boiling in water, and that all excreta and vomit from patient should be treated with a disinfecting solution and the water and food made sterile—the former by boiling and the latter by thorough cooking. The natives were advised against eating uncooked fruits and salads, and where a well or stream had furnished the water supply, the further use of water from same was forbidden, and in many instances wells were filled in and water supplied from the ice plant. When the sick were removed it was customary to allow one member of the family to accompany the patient to allay fear, and as far as possible the nurses and immediate attendants were selected from their own people.

The town was divided into six districts and a careful house-to-house inspection was made each day by a native inspector accompanied by a mounted soldier, whose duties were to report all cases of sickness. When a case was reported it was visited by a native physician or by a military surgeon. A quarantine of houses in which cholera appeared was maintained by native police and native soldiers in order to limit the spread of the infection. This was accomplished by preventing neighboring families from visiting and partaking of the infected food and water of the household. The guards were also used as a means of controlling any other cases that might become infected from the same source as the original case, or from the bowel contents or vomit of this case, and preventing them from fleeing to some other town or barrio and thus spreading the infection to uninfected localities.

Numbers of barrios became infected after this manner. The natives are great visitors, and it is a very common occurrence for them to go great distances to pay each other friendly calls when such journeys have no elements of business or commerce about them. Many, too, became alarmed at the restrictions imposed by the surgeons, not alone on travel, but on households as to character of food and water supply, and were inclined to flee to remote places where it was expected that such restrictions did not exist. Some, perhaps, of the most ignorant, were honestly impressed with the belief that the epidemic was something imposed upon them by the Americans. It became necessary to proceed slowly and carefully to explain as best we could the object of our ordinances and our sincere desire to assist them. This was accomplished by a series of public meetings, which were largely attended by the leading men, where the nature and source of the epidemic were carefully explained and the proper means pointed out to combat the disease. These measures were more clearly understood, perhaps, because of their previous experience with vaccination for smallpox that had taken place only a few months before during the time of reconcentration, when 30,000 natives were vaccinated in the town alone by the military surgeons and hospital corps, with the result that not a single death

occurred in the entire province during the past year from smallpox, when every other year hundreds had died.

This argument was used to point out to them that the Americans had only their welfare in view in establishing quarantine and other restrictive measures. One very large public meeting was held in the court room of the fourth judicial district and was arranged for by Judge Linebarger, judge of the court of the first instance. Natives were invited to express themselves fully about the epidemic, and did so at length. It was learned from them that many doubted that it was true Asiatic cholera, as the mortality of the disease seemed so slight compared with the epidemic of 1882 and 1883, when as many succumbed in one day as have died here in the entire three months of duration of the epidemic. Many advanced the idea that it was the result of lack of proper and suitable quantity of food; but when we pointed to the Americans who had become infected and died and asked if they thought this infection the result of scarcity of food, they were, in part, at least, convinced that it could not be due to lack of food. The danger of the food and water supplies carrying the infection was pointed out to them, as also the best means of rendering them safe, and by this means we obtained, in part, at least, cooperation in our efforts to combat the disease. Especially valuable was a meeting held of the cabezas of the forty-eight barrios belonging to this town. The native presidente rendered valuable aid by sending out an order for each cabeza to report at the post hospital on a certain date. On that occasion every barrio of the town was represented by at least one, and in many cases by a number of delegates. They were urged to provide stations for boiling water in each barrio, to use for this purpose the large sugar kettles so much in evidence in all parts of the islands. They were urged to adopt ordinances compelling all natives to use this water under heavy penalty of neglect, and to avoid the use of all uncooked food, and especially to adopt some system for disposal of bowel excreta and under no conditions to permit its deposit in the vicinity of wells or streams. These directions were carefully explained by the native presidente in their own language, and they were in every instance asked if it was practicable to carry out the directions. When it was stated by anyone that it was not, owing to the lack of suitable facilities, the necessary assistance was rendered. Each cabeza was supplied with needed medicines and disinfectants; and they were informed that when it was necessary, if they would but make such necessity known, one of the surgeons would visit their barrios and give practical instructions in these sanitary measures. They were urged to keep their people at home, both to prevent their becoming infected at other places and their carrying the infection, and finally, each cabeza was told that if these measures were carried out, it was absolutely certain that the epidemic would soon be stamped out, and that he individually would be held responsible that they were carried out, and the result obtained would be evidence of his good faith, and where cholera still prevailed it would be proof that he was not doing his duty, and in that event the presidente of the town, to whom they were responsible for their positions, would be compelled to take summary action. This meeting bore good fruit, for from that time there was a gradual diminution of the cases until the epidemic ended.

At the important garrisoned town of Nueva Caceres, in South Camarines, we find the same contrast between American and native methods and results. Here the disease was probably introduced by a native sailor from a chartered transport arriving from Manila. The town proper, with a population of 23,000, showed only 182 cases and 120 deaths, while Magarao, a barrio 4 miles distant, with 6,000 inhabitants, had 293 cases and 249 deaths. The conscientious endeavor of the Americans to aid the stricken natives, to overcome their ignorance and prejudice, and enlist their cooperation, is again well exhibited. When the epidemic began, in the words of Capt. Shannon Richmond, assistant surgeon, U. S. Volunteers—

cases developed rapidly during the next few days, the highest number recorded in the city of Nueva Caceres any one day being 19, on April 14, 1902, while the highest number of deaths was 12, on April 16, 1902. Thereafter the number of cases markedly diminished, there having been 159 cases and 106 deaths in Nueva Caceres during the first twenty days in April, while during the last ten days there were but 15 cases and 7 deaths. Even while the epidemic was at its worst the disease did not confine itself to one or two localities, but was scattered more or less over the entire town. Though four of the inhabitants in one small house were attacked within

twenty-four hours, three of them dying, aside from the provincial prisoners there were no other instances of more than two being attacked in the same house, although many were living together. Particularly after the adoption of the plan of immediately transferring to hospital those attacked and sending to isolation camp all who had been in contact with the sick, it was indeed rare that more than one case developed in one family. Of the more than 500 men, women, and children in the isolation camp, but 3 cases of cholera developed, 2 of them resulting fatally.

The following are among the measures taken to prevent spread, etc., of cholera: A strong cordon, consisting of municipal police and constabulary, was placed around the city, while a military guard patrolled the river front. No person was permitted to cross the cordon without a pass and very few passes were issued. That commerce might not be too greatly interfered with and that those living in the towns surrounding might not suffer for want of food—no rice being grown in this province and Nueva Caceres being the only port in this vicinity—the following instructions were given: Three stations were established where the transfer of supplies might be made, each of these being under the personal supervision of an American inspector (school-teacher), one station being at the river-landing, one on the road leading North and the third one on the road leading East. Supplies were to be brought to the cordon, where they were to be deposited, while the conductor was to withdraw a distance of 20 feet. The party on the other side of the cordon was then to advance and receive the goods. The hours of the transfer were from 8 to 11 a. m., and 2.30 to 5.30 p. m. daily.

All boats, of whatever description, were carefully inspected by a medical officer before those aboard were allowed to land, he being the first to board the boat.

The city was divided into districts, each being in charge of an American inspector, and he, accompanied by a native presidente and two policemen, started out early each morning and made a house-to-house inspection of his district, sending back one of his policemen with notice of the fact when he found any cases or deaths, while the other policeman remained on guard over the house. The most of these inspectors, about fifteen in number, were American school teachers, who volunteered for the work and who rendered invaluable assistance, working both day and night.

A board of prominent men was appointed for the purpose of raising a subscription fund for the relief of cholera patients and those dependent upon them for support, by which means \$2,115 Mexican currency was collected, of which \$1,000 were paid by the Chinese residents, \$465 by Americans, \$430 by Spaniards, and the balance, \$220, by Filipinos. Most of this money was used for the construction of an isolation camp and for the purchase of food for those under surveillance there. The presidente municipal issued an order to the effect that all cases of illness, of whatever description, be reported at once, whereupon a medical officer visited the house and ascertained whether or not it was cholera. The bodies of all deceased were viewed, and if death was not the result of cholera a permit to bury the remains was given. The church was forbidden to hold services over the remains unless accompanied by a permit.

It having been found next to impossible to obtain fresh lime, all bodies of cholera patients, with the exception of two or three which were buried in fresh lime, were burned, the cremating being done generally at night, under the supervision of four discharged soldiers, who were employed as inspectors. A pit was dug into which was placed half a cord of wood, the body placed on this, covered with five gallons of coal oil, and within two hours would be entirely reduced to ashes.

During this period cases of cholera were being reported daily from many of the adjacent pueblos. As no official notice had been given of its existence in the town of Magarao, 4 miles distant from here, although many cases were reported from towns just beyond, an investigation was made on April 18, when it was discovered that there had been at least 49 deaths from the disease in Magarao during the previous eight days. The local presidente, who had misrepresented and concealed the facts, was suspended from office, and a man of intellect and force installed. Thanks to his strict observance of sanitary precautions and to the supervision and care exercised by First Lieut. H. A. Webber, assistant surgeon, U. S. Army, who visited Magarao daily, by April 27 and thereafter the average number of cases daily was but 3, although from April 10 to 26, inclusive, there had been 265 cases and 212 deaths—this in a town with a population of but 6,000. The number of cases there—the result wholly of neglect—was far greater than in any other town in the province, and the remarkably short time of seven days in which the epidemic was practically ended—there having been but 28 cases there from April 27 to May 31, some of these having come from near-by infected towns—is a notable example as to what, with proper sanitary conditions and precautions, can be done in the way of preventing Asiatic cholera.

Maj. Henry D. Thomason, surgeon, U. S. Volunteers, chief surgeon, Fourth Separate Brigade, reported from the same place June 14, 1902:

The following is a résumé of the general management of the epidemic: The directions contained in General Orders, No. 66, Headquarters, Division of the Philippines, provided that the inmates of a house containing a case of cholera should be promptly removed and kept in isolation at a separate point, except those required to attend to the needs of the sick. It was soon apparent, however, that such native attendants were infecting themselves and others, and the plan was early adopted of removing all natives who had been in contact with the sick, and none were permitted to remain in the infected house, but all were sent under guard to the established isolation camp, the sick case, if living, removed to the cholera hospital; if dead, the body was taken to the morgue in connection with the hospital, and the house immediately burned to the ground.

To this end a cholera hospital was established in Nueva Caceres in a building rented by the civil government and well adapted for the purpose. The hospital was placed under the command of First Lieut. H. A. Webber, assistant surgeon, U. S. Army, who had four hospital corps men assigned to him for duty.

In the opinion of the writer this method of compulsory and complete separation of the native sick from the well proved to be one of the most potent factors of controlling the disease. Certain it is that there was a continual and uniform increase in the number of new cases daily in Nueva Caceres until the establishment of this hospital, when an equally continual and uniform decline of the disease became apparent.

The bodies of all dead from the disease were burned at night, in an open field at safe distance from the city, the quartermaster's department furnishing the transportation for the removal of all bodies.

The isolation camp, located 2 miles from the city, consisted of several native houses, in addition to which the civil government erected a large nipa structure, 30 by 200 feet, for the accommodation of the inmates. This camp was practically a "reconcentrado" establishment. It was placed under the management of Hospital Steward Patrick Haughey, U. S. Army, who had three privates of the Hospital Corps under his direction. A separate hospital was established at this camp, equipped and managed by the Medical Department of the Army. This was in expectation that numerous cases would develop among those brought in from the various places of infection, but this expectation was not realized, as only 3 cases developed from this source, 2 of them proving fatal.

Rations procured by public subscription were issued to the inmates of the hospital. There were at one time as many as 500 inmates provided for in this inclosure, which was guarded by a cordon of native constabulary under an American officer of the organization.

The general plan of controlling the epidemic in Nueva Caceres served as a model for other infected towns in the province. The presidentes of all municipalities were directed by the civil governor to adopt and carry out similar measures, and, with a few exceptions, this general plan was observed and served everywhere a good purpose.

In addition to the work performed by the Medical Department of the Army in Nueva Caceres, medical officers, accompanied by men of the Hospital Corps, were sent to various towns and barrios in the province to assist the municipal authorities in the organization of local boards of health and efficient means of managing the sanitation. They administered to the sick and directed the proper disposition of discharges, and supervised the disposal of bodies. Whenever a rumor that cholera existed in any portion of the brigade territory was received from whatsoever source, a medical officer and hospital corps men were dispatched to the scene for investigation. Later, when more medical officers were available, some of these were assigned to prolonged duty in the larger towns and assumed charge of the hospitals at these places.

During the prevalence of the epidemic at Nueva Caceres, the ice plant of the Medical Department, under the control of the commanding officer of the brigade hospital, was kept in constant operation in order to continually supply distilled water, this supply being a gratuitous daily issue to natives and others. The water was conveyed in a pipe to a convenient point and all natives were directed, and in many instances forced by the municipal authorities, to use this water only. As a result many hundreds of families and other persons availed themselves daily of this means of securing sterile water, and this is believed to have been the means of saving many lives, at the same time doing much toward prevention and against the spread of greater infection in the city.

At the time of the outbreak a normal school for native teachers was in session in Nueva Caceres. About fifty of these natives were in attendance under instruction

of a large number of American teachers, brought in during the regular vacation from their permanent assignments throughout the province.

Upon invitation of the deputy division superintendent of public instruction, the writer addressed this gathering of American and native teachers in relation to sanitary matters in the Philippines, with special reference to the cholera situation.

All of the male teachers volunteered their services to the board of health and the work of conducting the normal school was left with the American women teachers. These gentlemen were assigned to duty as house-to-house sanitary inspectors. To each was apportioned a city district, and the services of these teachers were invaluable in securing and maintaining a marked improvement in sanitation, general and personal, as well as reporting to the authorities all cases of illness discovered, for investigation by medical officers. The services of Chaplain Dickson were especially valuable, not only in Nueva Caceres, but in many other towns within the province which he visited, and in which he gave practical instructions, translated into Spanish and Bicol, to large audiences of natives, on the origin and nature of cholera, methods of its prevention, and management. Through him it was discovered that a large number of native "practicantes" (doctors) were teaching the people to sterilize water by heating a piece of iron or a stone very hot and then dropping the same into a receptacle containing water. By these means the people were given to understand that the water was rendered harmless for drinking purposes.

The chaplain in his instructions practically demonstrated what boiling water was, producing it before them to aid their comprehension of the lesson. He also gave personal attention and direction in the proper cremation of bodies. His work in various capacities everywhere during the epidemic was of the highest importance, and the results obtained were most gratifying.

The success attained in protecting the lives of United States troops, surrounded as they were with the disease, was very marked. It is hardly too much to say that nearly every case of cholera in an American soldier resulted from a willful or careless violation of standing orders, and could have been prevented had the man himself taken the trouble to carry out precautions, with which he must have been thoroughly acquainted. In a small proportion of cases the disease may have been unavoidable, and even acquired while actually engaged in the work of sanitation and quarantine among the natives, but by far the larger number has been traced to unauthorized visiting of native huts or eating and drinking forbidden articles. The immunity enjoyed by troops seems to have been directly proportionate to the strictness of the discipline maintained. Where violation of sanitary regulations was promptly followed by trial by summary court and punishment, the best results were obtained. There was, of course, some difference noted in the energy and good judgment displayed by post commanders and medical officers. Here and there occurred a failure to promptly grasp the situation or a lack of force in grappling with it, although, as a rule, both line and staff officers worked most faithfully and efficiently.

In a most able and interesting report, dated August 19, 1902, Maj. Charles E. Woodruff, surgeon, U. S. Army, chief surgeon, Third Separate Brigade, writes:

As there are but two ways in which the infection can be carried into a new field, it is found that whenever the first case can be traced it is either a new arrival infected elsewhere or he has eaten infected moist foods which have been carried into the new districts. The latter method is rare, and is best shown at Bifian, where a native cook under a pass signed by the Manila board of health smuggled into Bifian, Laguna, under the name of coal oil, foods which he used at a fiesta, and to this fiesta are directly traceable the first 80 cases in the town, the cook dying a few hours after arrival, himself probably infected in Manila from the same source which infected the foods. In every other authentic instance there is direct proof that there was a newcomer who was infected prior to arrival and was taken sick shortly afterwards, often the same day.

The period of incubation is so short that it makes this evidence stand out with startling distinctness, for as a rule these travelers are sick when they arrive. For

instance, the first cases at Dasmarinas, Cavite, June 5, were members of the constabulary who had spent June 1 at the harrio of Paliparan, 8 miles away, where cholera was present. The first case at San Pablo, Laguna, was a native who for three days visited Santa Cruz, where it had been epidemic for nearly two months, and who was taken sick twelve hours after his return and died thirteen hours later.

This being a territory (Laguna and Batangas) under military control, with closed ports, it has naturally been suggested that infected soldiers carried the disease into it and started the epidemic, particularly as the first cases to which public attention was given were soldiers transferred from the Ninth to the Eighth Infantry and who died at or near Santa Cruz shortly after their arrival from Manila. This has been definitely disproved by the investigations of Major Thomason, surgeon, U. S. Volunteers, and First Lieut. James M. Phalen, assistant surgeon, U. S. Army. Their report leaves no reasonable doubt that clandestine arrivals among the natives had introduced the infection and that they were dying of the disease for fully a month before it was more than suspected. Indeed, five of the first six cases were not among the Ninth Infantry arrivals at all, but were men who were at or near Santa Cruz for some time in the Eighth Infantry. The Ninth Infantry arrivals did not show symptoms until the fourth or fifth day after arrival, and as the majority of all cases have a less period of incubation, there can be no doubt of their infection after arrival.

After the infection has been introduced into a new place its spread in that place is invariably by the water or food. Cold cooked foods are splendid culture media and if flies or dirty hands deposit the vibrios thereon or they are moistened with infected water the development of the germs in this climate is tremendously rapid, and in a few hours the food contains enough germs to be fatal. A few germs can undoubtedly be disposed of by a healthy stomach, but not such myriads as must exist on foods infected for over eight hours. While all this is theoretically true and has been definitely proved to be the source of so many cases in Manila, where we know the water is uninfected, yet, excepting one case, we have nothing in the provinces but surmises and in every one of these cases it is known that there was a possibility that infected water may have been taken at the same time. This single exception is the cook of Company I, Eighth Infantry, who died of cholera May 29 at Majayjay, Laguna. He had been in the habit of eating pieces of raw meat, and as the latter came through a cholera-infected country, in boats on which natives died of cholera, it might have been infected. It would be conclusive were it not for the fact that cholera had existed in Majayjay among the natives for twelve days, whence he might have been infected. Three cases in the prison at Santa Cruz were believed to have been infected by food carried in by natives.

Raw vegetables like cabbage, lettuce, and celery are the most dangerous, for they are often spread over with human manure and were the undoubted means of introducing cholera into Manila from China, and though we have no such proof in the provinces where this process is not the rule, yet it is possible that vegetables are responsible for some spread, as they may have been washed in infected water. Fruits seem harmless unless eaten in excessive amounts, producing a fermenting mass in the stomach, offering a splendid culture medium for the multiplication of a few germs accidentally present and which would otherwise perish. The subsequent enteritis gives the germ an entrance into the mucous membrane. In only one case, at Lipa, is there a suggestion of infected fruit, and here several of the first cases had eaten of the same pineapple. Whenever cases seem to be due to fruit we can not exclude the almost certain fact that infected water was taken also.

The ease with which the germ is killed by heat, drying, and sunlight also shows that the chief means of spread must be by moist germs kept from sunlight and therefore by drinking water infected by bowel discharges. This is the experience in the province so often as to be practically the only way of spreading the disease locally. It is best shown by the town of Lucubhin, on a mountainous peninsula 10 miles from Balayan, Batangas. Here the people use water from a clear, shallow mountain stream running through the town. The first cases were followed by a tremendous epidemic, which killed nearly 25 per cent of the population of 3,000, and which ceased after heavy and prolonged rains swept the stream bed clear. Where there are many wells in a town there is never such a widespread epidemic as this. It is not likely that every well should become infected at the same time. Hence cases are sporadic and in a station (San Fernando, Pampanga) in the Second Brigade it was clearly shown that the widely scattered early cases in the town all took water from a popular well, which could have been easily infected from a case in the adjoining house.

The first cases at Lipa occurred in shacks scattered along a stream running through this town. Within forty-eight hours the infection of the water supply, including the streams, wells, and spring, seemed general, as no portion of the town was

spared. The better class of Filipinos, who use rain water collected from their tin roofs, have so far escaped.

At San Pablo the second case (fatal) developed forty-one hours after the first and was a Chinese laundryman who had drank unsterilized water from a ditch flowing just in rear of the building occupied by the first case, and this ditch was probably used as a sewer and received the bowel contents of the first case.

One of the best examples is at Balayan, Batangas, where the extensive epidemic was confined almost exclusively to people in a part of the town using river water infected by the first case. Natives using spring water escaped.

While this is undoubtedly the main method of infection, it is to be conceded that the extremely filthy habits of natives make it possible for them to infect anything and everything, and in many cases render it impossible to determine the channel of conveyance.

Infection by flies has been suggested at Lipa, where one company under an inexperienced officer had eleven deaths, while another company with an older experienced officer escaped. The former was not quartered so well, and it is said that from the location of the latrine there was more chance of flies carrying the infection. As the dry-earth system was used, as no cooked food is ever kept in barracks any length of time, and as many of the cases confessed to having drank water in native houses, it is safe to say that there is no reliable evidence that flies are responsible for any infection among troops.

Infection in hospital from other cases has been suggested on account of three cases at San Pablo in men recently sick in hospital. The report of the surgeon shows conclusively that these men with the carelessness characteristic of negroes had eaten in native houses, one while still on sick report and the others immediately after their return to duty. Direct infection from the patient is not possible except by swallowing his bowel movements, and the experience so far is unanimous that it is like typhoid—very difficult for nurses and attendants to acquire if the ordinary precautions are taken. There is practically no danger in treating cholera in the hospital, though of course a separate hospital is always desirable, as it keeps all infection from the main hospital, where asepsis is better than disinfection after infection.

A feature of this disease is the extreme difficulty of eliciting truthful replies from the sufferer. This has been noted as universal in natives and was thought to be a race characteristic. It has been practically impossible to get any information as to the source of infection from the native himself. He will not even give the least information as to his home or employment. The same feature, though to a less degree, has been noted in white men, who have no reason whatever for concealment of any fact. Prevarication seems to be a symptom and indicative of an altered mental tone due to sluggish cerebral circulation. After the withdrawal of so much fluid from the body the blood has completely changed its appearance and composition, being a dark, thick mass, incapable of carrying oxygen to the brain, and without this normal thoughts are impossible. It is generally stated in all classical descriptions of cholera that the patient is rarely delirious, but may be clear-headed to the last, omitting, of course, the coma toward the end and the febrile delirium in the secondary or typhoid condition. As clear-headedness is evidently impossible, the condition is one of more or less apathy—cessation of thought, instead of delirium. The mistake evidently arose from the fact that there is rarely a toxemic delirium as in typhoid or pneumonia.

The point to be emphasized is this: For the purposes of this investigation it has been found difficult, and in some cases impossible, to induce the soldier to confess where he had been eating and drinking. This symptom has handicapped investigations as to sources of infection in the provinces, but there is every evidence of the truth of the following conclusion as to soldiers—every case (with few exceptions mentioned below) is due to eating and drinking away from barracks, and in the vast majority of the cases it is the fault of the drinking water. If soldiers had stuck to the company kitchen food and drink, the 88 who died would have escaped. An undoubted source of infection has been in the houses of native prostitutes, but it is not susceptible of the least proof, as it is never admitted. This can not be prevented short of putting every company in quarantine under guard except while on duty. This was ordered as a last resort at San Pablo, and successfully, but it is not practical as a permanent thing when there is but little cholera in a town, and hence a few cases are inevitable.

Finally, the familiarity with the disease and the ease with which our simple precautions protect has undoubtedly bred a certain contempt for it and led to a false sense of security. As an epidemic proceeds there will be lapses by some men, as for example, the last three cases reported, one each at Calapan, Bay, and Santa Cruz. In no other way can we explain some of the six deaths in the hospital corps, the very men who know the most about the needed precautions. One of these (at

Calamba) was known to drink in a saloon in disobedience of orders. One was an acting hospital steward, a graduate in medicine, who so far forgot himself as to eat in a Chinese restaurant while casually at Batangas. As before stated, we have no data that any nurses or attendants have contracted the disease directly from the infected person, excepting Capt. H. R. Lemen, assistant surgeon, U. S. Volunteers, who had been making numerous post-mortem examinations and was much reduced in health.

At San Pablo some soldiers infected had complained of the mess, and as it is extremely difficult to improve the table fare in present conditions, and as some companies fare very badly, there is great temptation for soldiers to go elsewhere for food.

The interpretation that field conditions exist prevents issue of coal oil or lamps, and this drives the soldiers from the gloomy barracks in the evenings to the pleasanter saloons and other resorts, and throws more temptation in their way if they are not closely quarantined, and close confinement can not be kept up indefinitely on account of its depressing effect upon mental and physical health, so that occasional cases may occur as long as the epidemic lasts.

On account of rumors of increase of cholera since the military surgeons have stopped work, it was deemed necessary to issue a warning as to the increased dangers and necessity for continued vigilance. The soldiers had evidently relaxed somewhat, as occasional cases were reported up to August 24.

Of the 8,000 officers and soldiers who have served in this brigade up to August 17 while cholera was present, only 90 have died of it, 2 officers, 59 white, 14 colored soldiers and 15 native scouts, about 11.2 per thousand. When we consider that they have been surrounded by it, and that there were innumerable ways in which it might be contracted, the result is not bad, and speaks eloquently of the faithful execution on the whole of the sanitary suggestions of the medical officers. Formerly, under like conditions in India, before medical officers were able to suggest remedies, the regiments were well-nigh destroyed.

Of the 990,000 natives in the same territory, we have reports up to August 17 of 8,534 deaths, a rate of 8.6 per thousand, but from the large number of places from which we get no reports—at least one-fourth of the territory—and the known fact that a large number of deaths are concealed at places from which a few or none are reported, it is safe to say that there have been 25,000 deaths, or 25 per thousand; a fair proof of the success of town sanitation, in spite of native filth and obstruction, for in former epidemics the mortality was enormous. Nevertheless, not one of the 90 soldiers should have died and in the most of these cases we are certain that the cause was the careless or willful disobedience of the soldier. In the presence of all dangers it is the rule for a certain percentage of young men to die of their own foolish acts in spite of excellent discipline. Deducting these, there remain some for which the officers are responsible from inattention to details of division orders. This is notoriously the case at San Pablo. How far the neglect to boil water at Pagsanjan can be considered responsible for half the mortality of the Eighth Infantry is difficult to say, but, from the known fact that by boiling the water—even of spring waters, which are sometimes fatally infected—we have greatly reduced the mortality from all intestinal diseases, it is safe to say that at Pagsanjan there was a serious if not fatal disobedience of Division General Orders, No. 58, of March 23, 1902.

At Santa Cruz, Laguna, no board of health was established until the arrival of Major Brewer, representing the insular board of health, after the epidemic was severe.

Department telegraphic orders of May 14, to have detachments en route carefully supervised by officers or noncommissioned officers to see that each man observes proper precautions, was not observed by the Eighteenth Company of Native Scouts en route from Tiaon, Tayabas, to Batangas, province of Batangas. They drank unboiled water from a small stream, draining barrios of Lipa, and drank from native houses along the route. As a result there were deaths of the commanding officer, a hospital corps private, 2 white teamsters, and 5 scouts.

The following quotation from Major Thomason's report shows a very serious violation of these orders in the case of recruits sent from Manila to San Pablo: "It is stated that this party of recruits, 32 in number, were sent up from Manila on a casco, and that they were supplied with neither water nor rations before starting. By some mistake of the captain of the boat they were partially unloaded at Pasig, and here some of the number obtained food from the natives. The others had nothing to eat until they arrived at Bay, though they had started from the Cuartel de Espana early in the morning before getting breakfast. They obtained some water from the launch which was towing the casco, but many of them drank from the Pasig River and from the Laguna de Bay. Seventeen of these recruits went to San Pablo and two of them were taken sick with cholera the same day, June 15, eight and ten hours, respectively, after their arrival in San Pablo, and both died the same day."

The occasional futility of all precautions is best shown by the report of the surgeon

at Indan upon a case developing in a detachment traveling from Indan to Naic, Cavite. "The soldiers were under the immediate supervision of a noncommissioned officer with explicit instructions to guard the soldiers against cholera from infected food and drink en route. I was present when the detachment left station and saw personally that each soldier was supplied with a canteen of sterilized water." In a hard march in the tropics perspiration is so excessive that it takes but a half hour to transfer the whole contents of a canteen to the skin via the usual channels; hence sterile water should be carried along, but as this is often impracticable a few deaths are unavoidable, as the thirsty men will drink. This is shown in the enormous death rate of teamsters—34.5 per thousand. As copious drinking is a means of avoiding sunstroke there is really a danger of death from heat on one side or cholera on the other. As sterile water is the main reliance, it is evident that we have made a mistake in not insisting upon a special order that the first consideration in moving troops in cholera territory shall be to reserve transportation for sufficient water to last the command until it reaches a place where a renewal of the supply is possible. It is just to call attention again to the fact that this failure to supply sterile water to the soldiers of the Ninth Infantry en route from Manila to join the Eighth Infantry at Santa Cruz was not the cause of the outbreak at Pagsanjan. They were seen drinking Pasig River water, and this has repeatedly been affirmed to have been the source of their infection, but it is not correct. They were infected after arrival at Santa Cruz and Pagsanjan.

It has not been possible to determine whether the numerous details of department telegraphic order of June 3 were complied with, but from the best information available it is shown that there has been an earnest effort along these lines as a rule. There are variations in the thoroughness with which they have been enforced, but nothing calling for any further comment except as elsewhere stated. The more a pueblo is spread out and the more barrios it has, the greater has been the difficulty of doing anything for the natives. It is not likely that the spread of the epidemic could have been markedly lessened except by quarantine guards on all roads, requiring 25,000 troops and four times the number of medical officers, who would then be overworked.

The relative susceptibility of the various elements of the Army and natives, by reason of above-mentioned facts is clearly brought out by the rates per thousand at which they died up to August 17, the figures being only approximate:

	Number of deaths.	Approximate rate per 1,000 present.
Officers	2	9.5
White soldiers	59	10.0
Colored soldiers	14	22.0
Native soldiers	15	8.8
Quartermaster employees	19	34.5
Natives	8,584 to 25,000	8.6 to 25.0

The village death rate of course varies from nearly nothing up to 250 per thousand, as at Lucuhin and here, were it not for the providential rains it would have been nearly 1,000 per thousand, or total extinction, as occurred in many villages in 1882. The colored death rate—nearly equal to the highest estimated native rate—is very suggestive and in marked contrast to the lowest rate—that of the native scouts, who have shown themselves so amenable to discipline.

It is suggestive that at Lipa and San Pablo, where so many died, there were no summary court proceedings instituted against any soldier, while at Calamba, where all the cavalry command escaped, "the post commander has maintained a high standard of discipline and has punished any violation of rules with as great severity as possible. He has had ten or twelve men brought before a summary court for violation of rules concerning cholera," and at Bifan, one of the worst infected towns on Laguna, where only three soldiers died (all of whom, by the way, were in active cholera work), orders were issued "covering all essential points in prophylaxis, but these orders were rigidly enforced."

CONCLUSIONS.

Quarantine.—Since it can be accepted as proved that 95 per cent of cases of cholera is carried into new territory in the bowels of infected travelers, the most essential item in managing an epidemic is a quarantine, and the closer this approaches nonintercourse the better. Of course an absolute isolation is not possible, as no place is so

self-sustaining that it can dispense with trade in foods and other necessities. But this trade would be harmless if the merchandise were dry and all persons were quarantined five days at point of arrival. There being no known instance of the period of incubation being longer than five days, this would catch all infection, and the accompanying reports contain instances of an incipient epidemic being wholly averted by promptly isolating the first case and disinfecting the contaminated area. Quarantine at point of departure is evidently suited for marine travel only.

Interference with commerce of necessity causes great loss, and the merchants invariably protest to such a degree as to bring political pressure and overturn the necessary system, and this has no doubt happened here as it does in the United States. The loss of life is considered a necessary concomitant of trade in this condition as in every other, and must be accepted as inevitable.

The Malay is very human, and in infected areas is just as much opposed to quarantine as Americans at home, and he will violate it if he can. In addition, it seems impossible for him to comprehend the situation and as a rule he looks upon the restrictions as unnecessary hardships. His life is one long struggle for existence and defense against competitors, so that his experience teaches him that what is for the benefit of others is generally to his own disadvantage. Hence, the desire to avoid restrictions of all laws. Totally unnecessary travel is indulged in clandestinely, and the quarantine lines have been broken through, carrying infection, as at Lipa. A distinct track of cholera also could be traced along a back trail from Lipa to San Jose. The guards themselves are unreliable, being ignorant natives. These and many other conditions interfere with quarantine, and many people argue that as the disease will spread anyhow, there is no need of quarantine at all. This is fallacious. Because a human invention is not perfect is no reason for abolishing it. If it were, then all health regulations would be abolished, and even all laws. The fact is the reverse, although very imperfect, a quarantine is beneficial and certainly checks the spread of the disease, and we desire only to hold it in check for the few months it takes to destroy the virulence of the germ. Already the adverse climate conditions, different from its home in India, are so weakening it that a much larger percentage of infected people are recovering than at first. Hence, the medical officers have been doing good work in insisting upon as rigid a quarantine as possible and have been strongly supported in their efforts by the troops.

Unfortunately these provinces (Laguna and Batangas) are particularly dependent upon outside food supplies, as it was just recently a military necessity to destroy much of the food supplies stored by the enemy in the mountains, and much more laxity was necessary than elsewhere. Indeed, at one place quarantine was forbidden by local orders, though this may have followed from the failure of the medical department to state the benefits of a quarantine in a clear and forcible manner. It was considered necessary to remove restrictions from the people so as to remedy the ill effect of war and content them to settle to civil conditions, and the extra deaths due to lack of quarantine must be looked upon as a political necessity and one of the penalties of war. In other places the quarantine did good in proportion to its perfection.

The best illustration of these facts is seen in the comparison of Bay and San Pablo. At the latter, an inland station, a quarantine was recommended, but "was not thought feasible by the post commander on account of natives being compelled to go to Bay from all sections of the country for the purpose of procuring rice." This town was infected May 21 from Santa Cruz and had 571 deaths to August 9. Bay, nearly as large a place and most unfavorably situated as to sanitation, was carefully quarantined, although it is the largest shipping point on Laguna de Bay, having an average of 20 to 25 cases daily since May 1, as many as 60 persons being in detention camp at one time, and yet it had but 64 deaths to August 10. Much of this excellent result of Capt. H. W. Eliot's work is no doubt due to the care with which he searched for and destroyed forbidden articles, like tomatoes, and the careful searching for and isolation of the sick and disinfection of their houses, but it can not be denied that his detention camp lessened the number of cases he had to search for and isolate, and that there were, therefore, fewer places in which soldiers could be infected. At San Pablo the places where infection was possible were exceedingly numerous.

At Calamba, also, a rigid quarantine kept out the disease until May 12, when a case occurred on a casco and a woman in the town was stricken May 13. Then no other case occurred until May 27, when an infected native came in town from the Cavite line. Other towns on Laguna got the disease early in April, only two to three weeks after its arrival in Manila. Every check like this to the spread is a distinct advantage, while we must wait for the germ to lose virulence. Detention camps are, therefore, essentials of a land quarantine.

The essentials of managing a cholera epidemic.—The main thing is to institute a system of constant search for the sick to isolate them, with the sole purpose of destroying their

discharges and disinfecting the premises. Burning of houses is not necessary, nor is burning the body nor the use of disinfectants in the grave—cemeteries never spread infection—deep burial killing pathogenic microbes. It is immaterial whether isolation is in the home or in the hospital, as far as managing the epidemic is concerned. The advantages of the hospital are the vastly increased chances of recovery from better treatment possible therein. For instance, at the Bifian Cholera Hospital, under the most admirable system inaugurated by First Lieut. B. J. Edger, Jr., assistant surgeon, U. S. Army, the mortality was less than 40 per cent, while outside it was nearly 80 per cent. Natives, seeing the good results, voluntarily came there, and its fame spread to the adjoining province of Cavite, from which people came to enjoy its benefits.

Detention camps for contacts are not essential, as we have little or no proof that contact infects. Those living in the same house must be quarantined to secure subsequent cases which have been infected from the same source as the first. If they observe proper precautions they can safely be left at home, but as they will rarely do this, and as the native guards can not be trusted, it is merely a matter of humanity to remove them to a detention camp. As they detest the interference with personal liberty, they conceal cases to avoid confinement, and the camps for contacts therefore do more harm than good. This was fully tested at Bifian.

Removal of sources of infection.—As before explained, it is generally impossible to trace the channel and find the source, and it is necessary to act on the general principle that the water is at fault. All suspicious wells which can be easily infected are to be closed, but the main reliance is in boiled water. The natives are not capable of understanding its necessity and will not use it universally; nevertheless, public boiling stations where it is freely supplied do good. For instance, there is no reason to doubt that the establishment of these stations in Santa Cruz was a powerful factor in stamping out the epidemic. Where a well could be isolated and kept from infection and guarded there was less virulence to the epidemic, and its virulence increased in proportion to the ease with which the common water supply could be infected.

Prevention of sale of fruits and vegetables to be used raw and protection of cooked foods from contamination, though less important, are necessary, as they prevent a few sporadic cases, and to this extent limit the foci for spread of new extensions of the epidemic.

Of course the only thing to do with thinking people is to give them individual instructions, so that every man can protect himself. Much was expected from such instructions to natives, through presidentes, cabezas, priests, and school teachers. Sometimes it seemed to be effective, as at Bifian, but generally there was disheartening failure from the inability of the natives to understand such abstruse matters. To their mystic minds the disease is carried by the air, and even the most intelligent are so fatalistic that they believe if their time has come to die it is futile to try to ward it off.

The habits of all savages, and these Malays are savages under control, are so filthy as to defy description, and it is not possible to put any town in a permanently satisfactory state. Sanitation, then, as demanded by telegraphic orders of June 4, though very desirable, has been found impracticable. Habits ingrained for thousands of years can not be changed in a day, and the minute we let up on our compulsory measures the natives slipped back into the old easy rut of filthy habits, and cholera increased, as at Santa Cruz, Laguna. Proper sanitation in all its details is merely an aid to carrying out the above four rules for managing an epidemic. The fewer the rules to natives the better able they are to comprehend.

The conclusion came to has been that the nearer the surgeon worked along the above lines, the more successful he was and the further he departed from them the worse were his results. An example of excellent results is at Lilio and Nagcarlang, and at San Juan de Boc Boc, one of the worst infected towns, losing one-eighth of its population, the command was never infected. The saving of life here by close confinement of soldiers, among other things, is in marked contrast to the loss of life through the liberties of the soldiers at San Pablo under identical conditions.

Cholera occurred in two or three instances on transports in the harbor at Manila and on board smaller inter-island vessels operated by the Quartermaster's Department. On August 26, 1902, the U. S. Army transport *Sherman* sailed from Manila for San Francisco via Nagasaki and went into quarantine at Mariveles the same evening. On the next morning a first-class passenger, a lady, became ill, and on the 28th a diagnosis of Asiatic cholera was made. The case terminated fatally on the 29th. After quarantining those in immediate contact on shore at Mariveles and disinfecting the ship, the voyage was resumed on

September 4. There were about 100 patients suffering from various complaints in an improvised hospital on the first troop deck, and between September 7 and 9, inclusive, 4 cases of cholera developed, with 2 deaths. On the afternoon of September 9 the *Sherman* arrived at Nagasaki. All contacts, as well as the two surviving cholera patients, were landed at the quarantine station, where an emergency hospital was established and maintained ten days, Contract Surgs. William C. Mabry and Henry C. Gemmill in charge. In a very complete report rendered on their return to the United States, these gentlemen say in part:

The fact that nine days elapsed between the termination of the first case of cholera and the outbreak on the first troop deck, the distance, with a deck intervening, and the entirely separate accommodations as to food and water, render it impossible to consider the first case as the focus of infection.

The fact that no further cases occurred among the first-class passengers or those occupying cabins on the saloon deck still further strengthens this conviction. It is our opinion that an undiagnosed, mild case of cholera developed in the hospital. This may have been one of the cases which ultimately died or developed unmistakable symptoms or the original case may have completely recovered, while the infective agent coming in contact with a weaker resistance produced the virulent cases mentioned above.

The transport arrived at Nagasaki, Japan, at 6 p. m., September 9, and was promptly boarded by the Japanese quarantine authorities, who at once made arrangements for the transfer of the two remaining of the cholera patients to the cholera hospital at the quarantine station. This transfer was accomplished about 8.30 p. m. Upon the suggestion of Captain Jackson, assistant surgeon, U. S. Volunteers, arrangements were made to quarter all contacts and suspects on shore at the quarantine station, the Japanese officials readily agreeing.

Early on the morning of the 10th of September Contract Surg. William C. Mabry and Harry C. Gemmill, with two acting hospital stewards, Hospital Corps, U. S. Army, 10 privates of the Hospital Corps, and 96 patients, having the necessary supplies and rations for five days, were landed at Megami, Nagasaki, Japan, with orders to establish and maintain an emergency quarantine hospital.

All the baggage and property of the detachment, including kitchen utensils and dishes, were thoroughly disinfected by steam or dry heat, articles destructible by these processes being subjected to carbolic acid sprays. Officers and men were given a hot water bath and the clothing worn subjected to fumigation.

Immediately after the personal disinfection was completed quarters were assigned and details were made for the diet and mess kitchens, wash houses, wards, and office, and these buildings carefully cleaned and prepared for occupancy. The Japanese authorities very kindly furnished some coolies to assist in getting stores up to the kitchen, and dinner was ready at 1 o'clock.

After an inventory of subsistence stores on hand had been taken, the following guide in the preparation of diets and serving of same was prepared:

1. Liquid diets will be served at 6.30 a. m., 9.30 a. m., 11.30 a. m., 3 p. m., and 5.30 p. m. The following articles are available: Canned soups, stock soups, beef tea, condensed milk, Highland cream, eggnog, cocoa, tea, coffee, and malted milk.

2. Special diets: In addition to the articles enumerated above, crackers, butter, soft boiled or poached eggs, oatmeal, arrowroot, jellies, and fruit will form articles of special diet.

3. Light diets: In addition to the articles already mentioned, bread, cracked wheat, potatoes, onions, tender steak, and chicken form articles of light diet.

4. Full diets: Fresh beef and mutton or beef stew or bacon or chicken will form the meat components; potatoes, onions, baked beans, string beans, pease, prunes, bread and butter, jellies, canned fruits, tea, and coffee will form the basis of selection of full diets.

Post Commissary Sergt. Charles Cone, U. S. Army, a convalescent patient, was placed in charge of the kitchen and prepared the daily menus, which were submitted to the attending surgeon for approval. The following is a specimen:

Diet list, September 15, 1902.

Liquid diet.—Breakfast: Chocolate or coffee. 9.30 a. m.: Malted milk. Dinner: Soup, vegetable. 3.30 p. m.: Highland cream. Supper: Beef tea.

Special diet.—Eggs, crackers, and butter.

Light diet.—Breakfast: Oatmeal, crackers and butter, eggs and coffee. Dinner: Soup, mashed potatoes, bread and butter. Supper: Creamed potatoes, bread and butter, tea.

Full diet.—Breakfast: Oatmeal, beef a la mode, bread, butter, and coffee. Dinner: Soup, boiled beef, corn, bread and butter, tapioca pudding. Supper: Vegetable stew, beans, bread and butter, jam.

An office in one of the larger buildings of the station was assigned by the Japanese authorities and sufficient furniture was soon in place to make it a comfortable working room.

By 4 p. m., on the 10th of September, the hospital was completely organized, no ill effects on account of excitement or exertion incident to transfer having been recorded, the total number of United States officers, soldiers, and civilians at the hospital on shore being 110 men, of whom 96 were patients from the improvised hospital on board the *Sherman*.

As the entire personnel of the emergency hospital thus established had been brought into more or less intimate contact with Asiatic cholera, the practical means of prophylaxis were considered of primary importance in issuing rules and regulations for the internal economy of the hospital. The methods adopted included:

Attention to water supply.—One hospital corps man was detailed to procure the water and cleanse the coolers. All men were compelled to drink only from the coolers in the hospital, and each man was furnished with an individual drinking cup. The water from the kitchen was obtained from another well, also by a specially instructed detail, and the water from both these wells was examined daily by a Japanese chemist.

Attention to food supply.—A careful inspection of the diets served was instituted, and all men of the cooking and serving force carefully instructed as to the necessary precautions. A table was so placed as to project on either side of a fence which separated the kitchen from the hospital building occupied by the patients. On the tables the diets were served, the fence effectually preventing contact of the patients with the kitchen force.

Sterilization of dishes.—The dishes were kept in the wash house in covered baskets. At meal time the men able to go to tables received their dishes direct from the hot water where they had been previously heated to the boiling point. Upon the completion of the meal the dishes were returned to the wash house, cleaned in hot water and returned to the baskets. The same precautions were taken with the dishes of the bed patients, separate baskets being used for these dishes. The dishes used by patients in the isolation ward were kept entirely separate and were sterilized in the same manner. One hospital corps private with two assistants had sole charge of this work.

Disinfection of hands and shoes.—A pail of 5 per cent carbolic-acid solution was placed at each entrance to the hospital wards, kitchen and office, and the men encouraged to wash their hands frequently; this rule being insisted upon before and after meals. A mat at each entrance was kept thoroughly saturated with 5 per cent carbolic acid and the men instructed to wipe their shoes upon entering and leaving the hospital and other buildings. A dry mat was placed just within each door.

Personal cleanliness.—All patients and attendants were compelled to take a hot bath every other day, except those who were too ill to go to the bath house, who were given sponge baths in the wards. Sinks reserved for the purpose in the wash house gave ample facilities for the washing of hands and clothing, towels, etc.

Policing.—The kitchen force was made responsible for the cleanliness of the interior of the kitchen and of their own quarters. Suitable receptacles with covers were provided and placed at the entrance to the kitchen to receive refuse. These were emptied twice daily by a detail of three men from the patients able to do such work. The contents were subsequently cremated by the Japanese employees.

The closets were thoroughly policed by a special detail twice daily, the cleaning of the cisterns which received the excreta being performed by the Japanese. The wash-house force was responsible for the cleanliness of that place. In the wards and grounds all available men were turned out for police duty twice daily, after which the hospital attendants mopped the floors of the hospital with 5 per cent carbolic acid solution.

Classification of cases and isolation of suspects.—The patients were divided as soon as possible in the following classes:

1. Convalescents. These occupied wards 1 to 6, inclusive.
2. Subacute and chronic cases with mild symptoms. These occupied wards 7 and 8.
3. Subacute and chronic cases with serious symptoms. These occupied wards 9 and 10.
4. Ward 12 was used exclusively as an isolation ward for cholera suspects, and was in charge of a special attendant.

5. Ward 11 was used as quarters for hospital corps men on duty in the wards.

Upon the occurrence of a case simulating Asiatic cholera in any ward, the patient was at once transferred with all his belongings to ward 12, and the ward in which the case occurred was thoroughly disinfected, the remaining patients in the ward being bathed and their property fumigated.

Prophylactic injections of cholera vaccine.—Eighty-five men in all received prophylactic injections of 1 gram each, and careful observation of the effects were made.

Exercise and bounds.—Ample facilities for outdoor exercise were afforded by the grounds about the hospital, and by the walks on the hillsides above. Bounds were described by verbal orders conformably to the wishes of the Japanese authorities, and were carefully observed by the men.

The office force consisted of two acting hospital stewards, Hospital Corps, U. S. Army—one regularly detailed and one a convalescent patient—one clerk, and one orderly. These, with the acting hospital steward in charge of the wards, slept in the office, which was a separate building from the hospital, but within sight of it.

All men were furnished, as were the patients, with a Japanese mat and mosquito bar and with a blanket and sheet from the supplies provided by the transport. The surgeons in charge were given a room in the detention house of the station well furnished and very comfortable. They messed with the men.

Inspections.—The executive officer was present at two roll calls daily, at which times such verbal orders and instructions as became necessary were published, and after which a sanitary inspection was made by him. The attending surgeon made two regular medical inspections daily, at 8 a. m. and 8 p. m., seeing individual cases oftener if occasion demanded. One or more Japanese physicians and directors made diurnal inspections, always accompanied by one or the other of the surgeons in charge, but not always at the stated hour of inspection, this irregularity being due to their work in inspecting vessels in the harbor, which was given precedence.

The surgeons in charge made daily visits to the cholera hospital, seeing all the patients thus isolated, consulting with the Japanese physicians in regard to treatment and diet, and carefully informing themselves as to the attention given the men.

Daily history.—September 10, at 8 a. m., 110 officers, soldiers, and civilians disembarked from the U. S. Army transport *Sherman*, and at 9 a. m. arrived at quarantine station, Nagasaki, where they and their property were thoroughly disinfected in the station. At 11 a. m. Private R. L., Company A, Fifth U. S. Infantry, sent ashore the night previous, died of Asiatic cholera. The body was cremated by the Japanese at 7 p. m. No suspects or new cases developed during the day.

September 11: At 9 a. m. the ashes of Private L. were delivered to the transport quartermaster. At 11 a. m. Acting Hospital Steward W. B. S., Hospital Corps, U. S. Army; Private L. B. N., Troop H, Eleventh U. S. Cavalry; Private M. M., Company I, Thirtieth U. S. Infantry, were transferred to ward 12 as cholera suspects, and specimens of stools taken for microscopical examination. At 1 p. m. examination of cultures made from intestinal contents secured from cases of A., H., L., and R. were examined and the presence of the comma bacillus in large numbers demonstrated in each case. At 8 p. m. several cases of diarrhea which had developed more serious symptoms were transferred to ward 10.

September 12: At 12 o'clock the cultures from the stools of S., N., and M. were examined and found to contain the cholera bacillus. The patients were at once transferred to the cholera hospital, and the entire hospital and detachment thoroughly disinfected as on the 10th. At 3 p. m. N. and Sergeant A., Troop K, Fifth U. S. Cavalry, were transferred from ward 10 to ward 12, and specimens for examination taken as before. At 8 p. m. Private G. E. O., Company I, Twenty-sixth U. S. Infantry, was transferred to ward 12. At the request of the Japanese officials specimens of the stools of Private J. R. G., Hospital Corps, U. S. Army; Second Class Private N. C. A., Corps of Engineers, U. S. Army, and W. F., quartermaster's employee, were prepared. Examination of cultures twenty-four hours later gave negative results. Cultures from the stools of all patients with suspicious diarrhea were examined for several consecutive days as a routine practice.

September 13: At 6.30 a. m. Private I. H., Troop L, Sixth U. S. Cavalry, was transferred to ward 12. Between 1 and 3 p. m. Sergeant A., Privates O. and H. were transferred to the cholera hospital, the microscopical diagnosis of cholera having been made. During the evening the isolation ward having been thoroughly disinfected, J. B., private, Company K, Eleventh U. S. Infantry, and Quartermaster Employees W. C. K. and W. F. were transferred to it. None of these men developed cholera, and there were no further suspects or cases during the life of the hospital.

September 14: At 4 a. m. Private H. died. The body was cremated the same afternoon and the ashes delivered to the transport quartermaster.

In view of the results obtained by the Japanese from the prophylactic injections of cholera vaccine, it was deemed advisable by the surgeons in charge to give the

men the benefit of this treatment. Arrangements were made with the Japanese authorities to secure the necessary vaccine. Data as to the effects of this vaccine upon Americans being entirely lacking, the surgeons in charge decided to personally take the injection with a view of so ascertaining the effect as to intelligently eliminate those patients unable to undergo the treatment. With this end in view, Contract Surg. William C. Mabry received a hypodermic injection of 1 gram of cholera vaccine.

September 15: On this day Contract Surg. Harry C. Gemmill received 1 gram of cholera vaccine hypodermically.

September 16: On this date 30 men were chosen, after a careful physical examination, to receive a prophylactic injection of 1 gram of cholera vaccine. Pulse and temperature were recorded before the injection was given and thereafter every four hours for thirty-six hours.

September 17: At 9.45 a. m. Private M. died. At 4 p. m. Private O. died. Bodies were cremated and remains disposed of as in previous cases. There having been no untoward results from the injections of the day previous, 53 more patients and attendants were given 1 gram of cholera vaccine hypodermically, and observations recorded as before.

September 18: No case of cholera having developed since the 12th, and microscopical examination of specimens from all diarrhea cases proving negative, hopes were entertained of the suppression of the outbreak, and preparations made for a prompt reembarkation on the expiration of the slated quarantine at 10 a. m. on the 19th.

September 19: At 8 o'clock a. m. Acting Hospital Steward S. and Private N. were discharged from the cholera hospital, but owing to the protests of the transport surgeon, these men were not reembarked, but, with their baggage, were turned over to the depot quartermaster, Captain Baxter, U. S. Army, at Nagasaki, Japan. Descriptive lists and transfer slips of the convalescent patients, Acting Hospital Steward R. and Sergeant A. with their baggage, were delivered to Captain Baxter; the men themselves remaining in the cholera hospital in the care of the Japanese surgeons.

Early in the morning the surgeons in charge were officially informed by the Japanese authorities that the quarantine would terminate at 10 a. m., and that sampans for the transportation of detachment and property were then waiting at the piers. Details were immediately made of all available attendants and patients, the property conveyed to the sampans, and the buildings and grounds occupied thoroughly cleaned. At 9.30 a. m. the sampans, towed by the quarantine launches, left the piers and at 10 a. m. the detachment of 102 men, with all property, boarded the *Sherman*.

Cholera vaccine, the preparation used with a view to conferring immunity from Asiatic cholera, is prepared as follows: As much of a pure, virulent culture of the comma bacillus as can be taken on a platinum wire loop one-sixteenth of an inch in diameter is added to 1 gram of a 0.5 per cent solution of sodium chloride. The solution is then agitated for a sufficient length of time to thoroughly distribute the bacilli throughout its bulk. It is then placed in a hot-water bath at a temperature of 60° C. for thirty minutes, after which sufficient carbolic acid is added to make the solution 0.5 per cent carbolic acid. The resulting preparation may be used at once, or preserved in sealed bottles for future use.

The present epidemic of cholera, being the first to occur in Japan in which this serum treatment has been used, no records have been published up to date, but the following information was given officially by the Japanese surgeons: The administration of 1 gram of the vaccine, hypodermically is after the second day considered as conferring practical immunity for one month and greatly enhancing the chances for recovery in case cholera develops. For example, as all the coolies of the quarantine station were obtained from a certain small town, upon the outbreak of cholera at Nagasaki, it was deemed advisable to inoculate the entire population. In one forenoon a number of inhabitants were inoculated. In the afternoon 10 cases of cholera occurred; of these, six cases were from those not inoculated, all of whom died; 4 cases occurring among those inoculated gave a mortality of 50 per cent. During the period of the epidemic no further cases of cholera occurred among the inoculated inhabitants of this town, while among the noninoculated inhabitants the course of the disease was unchecked. All officials and attendants of the station had received the prophylactic injection and no case had developed among them to date.

With a view of conferring a more complete immunity and one of longer duration, a second injection of 2 grams is given on the seventh day and a third of 3 grams on the twenty-first day. Such a series of injections is believed to confer complete or practical immunity for from fifteen to twenty-four months. Sufficient cholera vaccine was obtained for the complete immunization of the surgeons in charge and their

stewards. The injections were made during the voyage from Nagasaki to San Francisco and observations made.

In the treatment of Asiatic cholera there is used a blood serum antitoxin derived from a horse which has been immunized by successive injections of the comma bacillus after the method of immunization pursued in the preparation of the antitoxin of diphtheria of Behring, Roux, and Yersin. The regular dose of the serum is 18 grams injected hypodermically, repeated in twelve hours, although in practice from 10 to 72 grams are given, according to the severity and urgency of the case.

This blood serum antitoxin, as well as the cholera vaccine, is prepared in the Imperial Laboratory at Tokyo. They are not for sale and can be obtained and used by Government officials only. They are bottled in 30-gram blue-glass bottles, cork stoppered and wax sealed, and will retain their properties if kept in cool, dark storage from twelve to eighteen months. We were promised several bottles of serum and vaccine to take with us, but owing to the failure of a consignment to arrive from Tokyo in time and the exhaustion of their stock on hand, no serum could be given us, and only vaccine enough to complete our experimental injections en route to San Francisco. As to the efficiency of the blood serum antitoxin treatment for cholera, we had no opportunity for personal observations other than the 8 cases occurring in this hospital. In these cases, judging from the extended experience in the Philippine Islands and the means of treatment in vogue there, L., R., M., O., H., and A. stood absolutely no chance for life. L., M., O., and H. were bed patients in the wards and badly emaciated, and at the time attacked were in extremely poor condition physically. No power on earth, probably, could have saved these men; but the administration of the antitoxin, especially in the cases of M. and O., accomplished wonders. A few moments previous to the injection of the serum in the case of O., his heart beats could with difficulty be detected with a stethoscope and his condition was one of imminently impending death. He lived four days. The good results in M.'s case were as well marked. In the severe cases of R. and A., the antitoxin saved their lives, where other remedies undoubtedly would have failed. In the cases of S. and N., which were diagnosed at the earliest possible moment, a small injection in each case rendered the attack abortive, and at no time during their short illness was their condition markedly serious.

In such cases as produced suppression of urine the antitoxin restored the suspended function, and in all cases the comma bacillus promptly disappeared from the stools, as proved by numerous successive cultures resulting negatively.

We were officially informed by the chief surgeon, Mr. Kikuchi, that up to the time of our arrival in Japan they had taken from various ships and treated in the quarantine station hospital 31 cases of cholera in various stages with but 1 fatality. They with justice credited our comparatively high death rate to the debilitated condition of the individuals.

In Nagasaki and suburbs there were, up to September 15, 700 cases of cholera, many of which, owing to the popular prejudices, such as are always encountered in epidemics, received no treatment, but in spite of this fact, and that at times the supply of antitoxin was limited, there resulted a mortality of only 35 per cent, as compared with 72 to 80 per cent in the Philippine Islands and Manila, respectively.

The Japanese surgeons consider that a properly diagnosed case of cholera which receives prompt and intelligent treatment according to their methods rarely proves fatal. With this opinion, in view of the records produced, we are inclined to concur.

From the moment the Japanese quarantine officials boarded the transport *Sherman*, the night of the 9th of September, and so promptly and willingly began a thorough disinfection of the ship, until the reembarkation of the detachment which occupied the emergency quarantine hospital, their unflinching courtesy and obliging disposition impressed all who were brought into contact with them. The discipline of the station seemed perfect, and established rules were rigidly adhered to, but within these limits every effort was made to make the quarantine as little irksome as possible. In addition to these facts, the superintendent, Mr. Yokoyama, in honor of whom the hospital was named, and the chief surgeon, Mr. Kikuchi, saw personally that nothing was left undone which could possibly add to the comfort and efficiency of the hospital.

The subjective symptoms resulting from the experimental injections of cholera vaccine spoken of in this report were in no case of sufficient gravity to cause alarm, nor did any needle abscess develop at point of puncture, although there was always some swelling and occasional discoloration. The symptoms noted were classified in three groups.

Group I, comprising two-thirds of the cases, exhibited tenderness

eases. If relementation attains such an end and gives such result, I am of the opinion that it is thereby justifiable and lawful. On moral grounds the state can lawfully permit or tolerate an evil (which experience has proved ineradicable) and regulate it by law in order to prevent a greater one; thus the state may tolerate houses of prostitution in order the better to keep them under control and mitigate the terrible results of venereal contamination.

But although admitting the legality and morality of the principle of relementation, I do not thereby conclude that it is to be imposed under all circumstances. There are laws excellent in theory but of impossible application, and such laws are more detrimental than useful. Such is relementation—good in theory, good also in practice under certain social conditions and when fairly administered, but worse than useless where public spirit is against it, and its honest, integral application, impracticable.

All this being said, I wish to proclaim with emphasis my conviction that if official sanitary regulations may be good, moral prophylaxis is still better, that it must be the base and foundation of all reforms, and that without it none of the social evils can be successfully combated. It is in the conscience of the young man that prophylaxis should begin. In the last analysis one must fall back ever upon the paramount question of education, that is to say, the development of Christian character, in which church and state are vitally interested and must promote by all possible means.

* * * * *

The conference recognized without discussion that one of the most efficacious means of checking venereal diseases is to make adequate provisions for their treatment. To that end the following resolution (offered by Doctors Gaucher, of Paris, and Jadassohn, of Berne) was passed unanimously:

"It is desirable that the law should insure to all persons suffering from venereal diseases gratuitous treatment in the largest measure possible; that all regulations in hospitals, dispensaries, and clinics discriminating against such persons be abolished; that in the treatment of venereal patients in public institutions due regard be paid to their feelings and that professional secrecy be respected."

* * * * *

The instruction of youth and the general public as to the nature and danger of venereal diseases is another important subject which received its full share of discussion. There was a prevailing opinion that this knowledge should be vulgarized, at least among young men, so that they should not sin in ignorance of the possible consequences. In this opinion relementarists and abolitionists joined hands. Unfortunately there was great divergence of means proposed. Some wanted the instruction imparted to young men from 16 in all schools and colleges; others wanted the minimum age raised to 18; others thought best to restrict it to certain classes of still maturer young men, such as soldiers, sailors, members of clubs or associations, workmen in factories, etc. Not a few recommended the uses of pictures and casts as object lessons to produce a more lively and deterrent impression.

The following two resolutions, passed by unanimous vote, show the importance attached by the conference to this question of instruction:

1. Introduced by Doctor Troisfontaines, of Liege:

"To furnish each recruit coming to his regiment with a printed instruction upon the dangers of syphilis and gonorrhea, reminding him of the necessity, when suffering from these diseases, of promptly consulting a physician, adding, if deemed useful, brief indications concerning the dangers of alcoholism and the prevention of tuberculosis. On leaving the service the soldier should not forget to carry this instruction with him."

2. Introduced by M. Minod, of Geneva:

"The most important and efficacious means of combating the propagation of venereal diseases is the largest possible vulgarization of our knowledge of the gravity and dangers of these diseases. It is especially necessary to teach young men that not only are chastity and continence not prejudicial to health, but, on the contrary, most commendable from the medical point of view."

ALCOHOLISM.

Admissions to sick report from this cause in 1902 were slightly in excess of the number (including volunteers) for 1901. A total number of 1,830 cases, equivalent to 22.65 per thousand of strength, occurred; also 7 discharges and 24 deaths are to be charged to alcoholism during

the year. The small part of the Army serving at West Indian stations was decidedly more seriously affected than troops elsewhere, the admission rate in Cuba and Porto Rico being 48.26 per thousand, while in the United States it was 24.44 and in the Pacific islands only 18.56.

The comparatively good showing made by the forces in the Philippines is due to the remarkable temperance of the Philippine scouts, and also to the fact that organizations before going to the islands generally rid themselves as far as possible of men unfitted for tropical service, among whom there are always some enfeebled by alcoholic indulgence.

Measures taken during the cholera epidemic to keep men out of native huts have probably also contributed to diminish alcoholism in the islands.

While the admission rate for alcoholism represents only so much of the total intemperance of the Army as comes under the professional observation of the medical officers, nevertheless, when taken for a long term of years and for many thousands of men, it is a very fair index of the drinking habits of the troops. From the reports of the Surgeon-General for the past twenty years it is found that alcoholism is not nearly so great an evil in the Army as it was prior to the establishment of the post exchange, allowing the sale of beer and light wines to the soldier. From 1883 to 1888 the annual admission rate for alcoholism varied from 69 to 40 per thousand. When this last figure was reached the Surgeon-General reported, in 1889, "There is here manifested a gratifying temperance movement which it is hoped the canteen system may render more actively progressive," and in 1890, "Prohibition on the military reservation has been suggested and tried, but this has immediately invited the establishment of dens of dissipation and disease just beyond the jurisdiction of the commanding officer. License on the reservation, in the opinion of our medical officers, is infinitely preferable to unbridled license outside of it. It is believed that the canteen system will have a greater effect in reducing the statistics of alcoholism than any measure that has yet been tried."

This hope and belief seem to have been abundantly justified, as will be seen from the following tabulation, showing a steady decrease of alcoholism:

Admission rate for alcoholism per thousand of strength, Regular Army, 1889 to 1902, inclusive.

Year.	Rate.	Year.	Rate.
1889	41.48	1896	29.06
1890	40.73	1897	27.86
1891	40.01	1898	15.16
1892	37.23	1899	18.70
1893	33.97	1900	18.88
1894	30.94	1901	23.80
1895	30.11	1902	22.65

The Spanish-American war, by putting the whole Regular Army into active service, greatly reduced alcoholism, but the rates rose again in the next two years. In February, 1901, the sale of beer was prohibited in post exchanges, and admission rates increased markedly that year.

It is impossible, also, not to attribute a large part of the steadily increasing venereal disease of the Army to the loss of the canteen,

where the soldier, if he so desired, could get his beer throughout the month, but was not subjected to the temptations to intemperance and vice now attendant upon the expenditure of a full month's pay at the low resorts infesting the outskirts of our military reservations.

INSANITY.

A slight diminution of insanity occurred in the Army during 1902. There were 138 new cases, equivalent to an admission rate of 1.71 per thousand, which is almost identical with the rate for the decade 1891 to 1900.

Forty-eight insane men remained on the rolls at the end of 1901, making a total of 186 cases under observation during the year 1902, originating as follows:

Philippine Islands.....	114	Cuba.....	6
United States.....	63	Porto Rico.....	0
Hawaii.....	1		
China.....	1	Total.....	186
Alaska.....	1		

These cases were disposed of as follows:

Returned to duty.....	12
Discharged for disability while in military hospitals.....	4
Died in hospitals.....	2
Placed under care of municipal authorities, Manila, P. I.....	2
Discharged while in Government Hospital for the Insane.....	147
Died while in Government Hospital for the Insane.....	1
Remaining, December 31, 1902, in Government Hospital for the Insane (undischarged).....	4
Remaining in military hospitals December 31, 1902.....	14

The two cases placed in the charge of the municipality of Manila were Philippine scouts.

In 69 cases, or over one-third of the entire number, the diagnosis was melancholia, in 31 cases "delusional insanity," in 18 "acute dementia," and the remaining admissions embraced almost all the forms of insanity recognized by alienists.

Alcoholism was specifically mentioned as the cause of insanity in 25 instances, 13 men gave evidence of mental derangement prior to enlistment, 2 cases followed dengue, 2 occurred after mumps, and in 2 sunstroke was given as a cause.

Five cases were attended with epilepsy, 4 were noted as syphilitic, and 1 died in hospital of abscess of the brain.

Several years' experience seems to demonstrate that tropical service, while it undoubtedly slightly increases the insanity among soldiers, will not materially change the sick rates from this cause noted in past years.

INJURIES.

The admission rate for injuries during 1902 was greater than for the previous year, but the mortality rate was only slightly above one-half of that for 1901. With a mean strength of 80,778 men, 16,335 were admitted to sick report, 286 were discharged, and 219 died, giving a rate per thousand of 202.22 admitted, 3.54 discharged, and 2.71 dead.

The admission rates for the United States and Cuba and Porto Rico, 244.60 and 256.87 per thousand, respectively, contrast strongly with the admission rate in the Pacific islands, which was only 152.91 per

thousand. It was remarked by my predecessor last year "that in time of peace men report for admission to sick report and excuse from duty for slight injuries which would not lead them to do so if in service of an active or quasi active character." The small rate for injuries in the Pacific islands, where alone there was active service, and the large one at home furnish additional evidence in this direction.

The death rate from injury was: In the United States 2.16; in the Pacific islands 3.23, and in Cuba and Porto Rico 3.36.

There were 16 deaths from drowning in the United States, 32 in the Pacific islands, and 1 in the West Indies, equivalent in the whole Army to 0.61 per thousand of strength. This is less than the rate for the decade 1891-1900, which was 0.79 per thousand of strength.

Exhaustion from exposure and fatigue was reported in 43 cases in the United States, 61 in the Pacific islands, and 8 in Cuba and Porto Rico. One death occurred in the Philippines from this cause.

Eighty-five cases of heat stroke were admitted as against 207 cases the previous year. No death or discharge resulted from this cause. There were 13 cases in the United States, 71 in the Pacific islands, and only 1 in Cuba and Porto Rico. The admission rate was, therefore, considerably less than half of that noted the previous year.

One soldier was struck by lightning in the Philippines and 1 in the United States, both recovering without permanent effects.

Under the grouping "venomous bites, stings, and wounds" are included 535 admissions to sick report during the year, with no death and but 1 discharge. Of these the Philippine Islands furnished about one-half. Danger to life and health from the bites of venomous insects and reptiles in the tropical countries occupied by our troops is seen to be practically non-existent, scarcely greater than at home stations, and in comparison with the potency for evil of the mosquito in its disease-carrying capacity, sinks into utter insignificance.

There were 361 cases of hernia with 59 discharges, and 152 were operated upon, including 148 inguinal herniæ, 1 scrotal, 2 ventral, and 1 umbilical. One death only occurred after operation, and this was from measles.

Out of the total admission rate for injuries of 202.22 per thousand, 156.87 were abrasions, burns, sprains, contusions, and wounds incised, lacerated, and punctured. There were 52 fractures, not gunshot, and 15 dislocations.

In the Philippine Islands, excluding gunshot, 8 men were killed in action and 25 wounded, of whom 1 died and 5 were discharged; 7 were killed by the bolo and 1 by the spear. The wounded were injured as follows: Seventeen by the bolo, 3 by the spear, 3 by stones, 1 each by the Moro kris and the kampilan or two-handed sword. The single death was from a spear wound of the abdomen perforating the intestines in six places. Immediate operation with closure of the wounds by suture was done, but the patient died on the day of injury.

The following tables give details:

Wounds other than gunshot received in action (exclusive of deaths not on sick report.)

Character and location of wound.	Weapon.					Disposition.			
	Bolo.	Spear.	Kris.	Kampilan.	Stone.	Total.	Duty.	Certificates of disability.	Died.
Head:									
Flesh.....	1					1	1		
Fracture.....	1					1	1		
Face, flesh.....		1			1	2	1	1	
Thorax, nonpenetrating.....	1					1	1		
Abdomen, penetrating.....		1				1			1
Back and hip, flesh.....	2			1	2	5	5		
Arm:									
Flesh.....	1					1		1	
Fracture.....	1					1		1	
Elbow joint.....	1					1		1	
Forearm, fracture.....	1					1	1		
Hand, flesh.....	7					7	7		
Carpus and metacarpus, fracture.....			1			1		1	
Fingers, fracture.....	1					1	1		
Thigh, flesh.....		1				1	1		
Total.....	17	8	1	1	8	25	19	5	1

^a In one case, eye enucleated.

^b Wounded August 12, 1902; wound enlarged under chloroform, and six perforations of ileum closed with cat-gut sutures; died day of injury.

^c Wound cleansed and belly of triceps left arm sutured.

^d May 24, 1902, right arm severed by bolo cut; same day stump amputated by a modified circular-flap operation 1 inch below deltoid tubercle.

^e Wounded June 23, 1902; tendon of extensor communis digitorum severed by bolo; July 8, 1902, ends of divided tendon exposed by free incision and united end to end by kangaroo tendon. Annular ligament united by deep sutures of same material.

NOTE.—Three bolo-wound cases remaining in hospital at date of last annual report, were disposed of as follows: Wound of hip, recovered June, 1903; fracture of forearm, returned to duty February, 1903; fracture of finger, discharged for disability September, 1902.

Killed in action by wounds other than gunshot.

Character and location of wound.	Bolo.	Spear.	Total.
Neck.....	5		5
Chest, penetrating.....	1		1
Abdomen, penetrating.....		1	1
Not described.....	1		1
Total.....	7	1	8

^a These were beheaded.

^b Died of multiple incised and punctured wounds.

GUNSHOT INJURIES.

At the end of the calendar year 1901, 11 cases of gunshot wound remained under treatment—3 received in action and 8 otherwise. Of these, 3 died, 1 was returned to duty, and 7 were discharged for disability.

Gunshot-wound cases remaining in hospital January 1, 1902, showing dispositions.

Character and location of wound.	How received.							
	In action.				Not in action.			
	Remaining at last report.	Disposition.			Remaining at last report.	Disposition.		
		Duty.	Certificates of disability.	Died.		Duty.	Certificates of disability.	Died.
Face, flesh .....	.....	.....	.....	.....	1	.....	1	.....
Abdomen, penetrating .....	.....	.....	.....	.....	1	.....	1	.....
Elbow joint	1	.....	1	.....	.....	.....	1	.....
Forearm fracture .....	.....	.....	.....	.....	1	.....	1	.....
Carpus and metacarpus, fracture .....	.....	.....	.....	.....	1	.....	1	.....
Thigh:	.....	.....	.....	.....	.....	.....	.....	.....
Flesh	1	.....	1	.....	.....	.....	1	.....
Fracture, upper third .....	.....	.....	.....	.....	1	.....	1	.....
Fracture, middle third .....	.....	.....	.....	.....	1	.....	1	.....
Fracture, lower third	1	.....	.....	1	.....	.....	1	.....
Knee joint .....	.....	.....	.....	.....	1	.....	1	.....
Leg, fracture .....	.....	.....	.....	.....	1	.....	1	.....
Total	3	.....	2	1	8	1	5	2
					11	1	7	8

^a Wounded December 31, 1901; died of suppurative peritonitis, January 7, 1902.

^b Wounded October 16, 1901; died of osteo-myelitis left femur, June 10, 1902.

^c Wounded October 27, 1901; died of chronic septicemia, January 30, 1902.

In 1902, 74 soldiers were killed by gunshot, of whom 20 fell in action, 11 were accidental, 31 were suicides and 12 homicides. These cases are summarized in the following table, the nature of missile in each instance being indicated:

Killed by gunshot, 1902.

Character and location of wound.	How received.					Nature of missile.									
	In action.	Not in action.			Total.	In action.					Not in action.				
		Accidental.	Suicidal.	Homicidal.		Krag-Jørgensen.	Mauser.	Remington.	Slug.	Missile not stated.	Krag-Jørgensen.	Springfield.	Revolver.	Missile not stated.	Cannon.
Head, fracture	6	3	26	2	37	3	...	...	1	2	10	...	19	2	...
Neck	3	3	...	...	7	...	1	...	...	...	1	...	1	...	...
Chest, penetrating	5	3	4	6	18	1	...	...	1	...	5	2	4	...	...
Abdomen, penetrating	3	2	...	2	7	...	...	...	...	...	8	...	...	...	...
Thigh, flesh	1	...	...	...	1	...	...	...	...	1	...	...	...	1	...
Wound not described .....	...	1	1	1	3	...	...	...	...	...	1	...	...	1	1
Total	20	11	31	12	74	4	1	7	3	5	20	2	24	7	1

^a Upper part of body blown to fragments by premature discharge of cannon.

Excluding those killed outright, 329 men injured by gunshot were admitted during the year 1902, equivalent to 4.07 per thousand of strength, with 28 deaths, about 7 per cent of the wounded.

There were 96 soldiers shot in battle, of whom 20 were killed outright and 5 died as a result of their wounds, a little less than 26 per cent of fatality for all men struck, and a death rate for those not instantly killed of 6.57 per cent.

Four were killed in action and 11 wounded by the Krag-Jørgensen bullet; 1 killed and 16 wounded by the Mauser; 7 killed and 25 wounded by the Remington. In the cases of 5 dead and 11 wounded the missile was not reported. One man only was wounded with a revolver, and 1 by a fragment of the jacket of a bullet. Three soldiers were killed and 11 wounded by slugs from the lancata, the small cannon of the Moro forts.

Among the 54 men killed and 253 wounded by gunshot not in action, 11 deaths and 183 wounds were marked in line of duty, 57 wounded not in line of duty, 31 deaths and 7 wounds were suicidal, 12 deaths and 6 wounds were homicidal.

Of the 253 wounded, 19 died, 182 were returned to duty, 35 discharged on certificates of disability, 3 by order, 3 by expiration of service, 1 was dropped, and 1 deserted, leaving 9 remaining on sick report January 1, 1903.

The revolver which played so small a part in battle casualties was the lethal weapon in 24 deaths not in action and caused the wounds of 102 men, while the service rifle and carbine killed 20 and wounded 83. In 7 deaths and 35 wounds the missile was not stated and the remaining casualties were caused by the Springfield, the Winchester, the shotgun, blank cartridge, explosion of cartridge, explosion of black powder through the unclosed breech of a 12-inch gun, and one most unusual case in which the brass head of the friction primer of a 10-inch gun, insecurely seated, was blown backward, mortally wounding a bystander soldier by fracturing a vertebra and crushing the cord.

Among the wounded the skull was fractured in 5 cases, 3 of which were fatal; in 1 case the depressed fragments of bone were elevated.

Thirteen wounds of the face, including 6 fractures, were reported, with 9 recoveries, 3 discharges for disability, and 1 remaining January 1, 1903. In 1 case enucleation of the eye was necessary.

The neck was wounded in 6 cases, of which all recovered. Tracheotomy was performed in 1 case.

The single case of fracture of the spine is noted above.

The thorax was struck in 23 cases and penetrated in 13. In 1 non-penetrating wound death took place from traumatic pneumonia, the rest recovered. Four of the patients with penetrating wounds died, 8 were returned to duty, and 1 discharged.

In one case the bullet was located by the X ray and removed, the patient making a good recovery. In 1 fatal case a portion of the seventh rib was excised and an empyemic cavity drained.

Six instances of non-penetrating wound of the abdomen occurred, all recovering, but of 10 penetrating wounds 8 were fatal, 1 was discharged, and 1 only returned to duty. In both non-fatal cases laparotomy was performed and intestinal wounds closed by suture. In 3 of the fatal cases laparotomy was also performed; in one of them death resulted from acute suppurative cerebro-spinal meningitis.

The pelvis was fractured twice; fragments of bone were removed in each case, and in one the brass jacket of a Remington bullet; both recovered and were returned to duty.

The clavicle or scapula was fractured three times, all recovering.

The shoulder joint was penetrated once, with recovery.

Fourteen cases of flesh wound of the arm occurred; all recovered. In 2 cases subsequent operation for traumatic aneurism of the brachial

artery was successfully performed; in another case the musculo-spiral nerve was repaired.

The single case of fracture of the arm resulted fatally from septicemia after amputation at the shoulder joint.

Three wounds of the elbow joint were reported; all recovered, and all were discharged for disability. It was necessary in each case to remove bone from the joint, and in one to remove a portion of the ulna and the lower third of the humerus.

The forearm was fractured six times, with no death, but in 3 cases amputation was necessary.

The wrist joint was wounded once, with recovery.

The hand was wounded in 83 cases, including 10 fractures of the carpus or metacarpus, and 48 fractures of the fingers. All recovered except 1 case of fractured finger, in which death resulted from septicemia.

The finger was amputated 35 times, and 6 other operations on the hand were done.

The hip joint was not wounded during the year, but the thigh was fractured 6 times, with 3 deaths. In one of the fatal cases immediate amputation at the middle third was done; in another late amputation at the middle third for necrosis was done and death from osteo-myelitis finally resulted, and in the third case amputation at the hip joint was done several weeks after injury. One amputation at the hip joint resulted in recovery.

The knee joint was wounded in 4 cases, with no death.

The ankle joint was not wounded.

Thirty-eight wounds of the leg, including 11 fractures, were reported, with no mortality. Two amputations only were necessary and 3 operations for removal of bullet or fragments of bone.

The foot was wounded in 30 cases, including 8 fractures of the tarsus and metatarsus and 4 fractures of the toes. No fatal case was among these and only 2 operations, an amputation of the great toe and removal of the second toe with its metatarsal bone.

The following tables show in detail the data concerning the gunshot wounds treated during the year:

- A. Gunshot wounds received in action.
- B. Gunshot wounds other than battle wounds.
- C. All gunshot wounds.
- D. Gunshot wounds which terminated fatally.
- E. Surgical operations for gunshot wounds.

A.—Gunshot wounds received in action (exclusive of deaths not on sick report).

Character and location of wound.	Nature of missile.							Disposition.						
	Mauzer.	Remington.	Krag-Jørgensen.	Revolver.	Missile not stated.	Lanceta slug.	Jacket of bullet.	Total.	Duty.	Certificate of disability.	Died.	Expiration of service.	Remaining last report.	Total.
Head:														
Flesh			1					1	1					1
Fracture		1						1	1					2
Face, fracture						2		2		1			1	2
Neck					1			1	1					1
Thorax:														
Non-penetrating		2	2		1		1	6	5		1			6
Penetrating	2					1		3		1	2			3
Abdomen:														
Non-penetrating	1				1			2	2					2
Penetrating						1		1			1			1
Pelvis, fracture		1						1	1					1
Back and hip, flesh		2	1					3	3					3
Shoulder, flesh	1	1		1		1		4	3			1		4
Clavicle or scapula, fracture		1	1					2	1	1				2
Shoulder joint	1							1		1				1
Arm, flesh	2	2				1		5	5	1				5
Elbow joint		1	1					2		2				2
Forearm:														
Flesh	2	1			2			5	5					5
Fracture			1					1					1	1
Fingers, fracture			2			1		3	3					3
Thigh:														
Flesh	3	3			3	2		16	11	3			2	16
Fracture, lower third	1	1						2	1				1	2
Leg:														
Flesh	1	2			1	1		5	4	1				5
Fracture		2			1			3	2	1				3
Foot, flesh			1			1		2	2					2
Tarsus and metatarsus, fracture	2				1			3	2	1				3
Toes, fracture			1					1	1					1
Total	16	25	11	1	11	11	1	76	54	12	4	1	5	76

a Died of traumatic pneumonia.

B.—Gunshot wounds other than battle wounds (exclusive of deaths not on sick report).

Character and location of wound.	How received.				Nature of missile.						
	Accidental. ^a	Suicidal.	Homicidal.	Total.	Krag-Jørgensen.	Springfield.	Winchester.	Revolver.	Missile not stated.	Shotgun.	Fragment of bullet.
Head:											
Flesh	3			3					1		1
Fracture	3	1		4	1			1	2		
Face:											
Flesh	6	1		7					1	1	
Fracture	2	2		4	2			2			
Neck	5			5	2			2	1		
Spine, fracture	1			1							
Thorax:											
Non-penetrating	4			4	1					2	
Penetrating	8	1	1	10	7			8			
Abdomen:											
Non-penetrating	4			4	2			1	1		
Penetrating	6		3	9	2			4	3		
Pelvis, fracture	1			1		1					
Back and hip, flesh	5			5				3	2		
Perineum, genital and urinary organs	2			2				2			
Shoulder, flesh	2	1		3	1			2			
Clavicle or scapula, fracture	1			1				1			
Arm:											
Flesh	9			9	2			7			
Fracture	1			1	1						
Elbow joint	1			1	1						
Forearm:											
Flesh	6	1		7	1			3	3		
Fracture	4		1	5	1			2	1		
Wrist joint	1			1	1						
Hand, flesh	25			25	5			9	4	1	1
Carpus and metacarpus, fracture	10			10	7	2				1	
Fingers, fracture	45			45	26			10	5	3	
Thigh:											
Flesh	24			24	5			15	1		
Fracture, upper third	1			1	1						
Fracture, middle third			1	1	1						
Fracture, lower third	2			2				2			
Knee joint	4			4				4			
Leg:											
Flesh	22			22	2			15	4	1	
Fracture	8			8	2			4	2		
Foot, flesh	16			16	4	1		8	3		
Tarsus and metatarsus, fracture	5			5	3			1	1		
Toes, fracture	3			3	2			1			
Total	240	7	6	253	83	3	1	102	35	9	2

^a Fifty-seven of these were not in line of duty.

B.—Gunshot wounds other than battle wounds (exclusive of deaths not on sick report).

Nature of missile.							Disposition.								
Cannon.	Powder.	Blank cartridge.	Explosion of rifle.	Explosion of car- tridge.	Explosion of primer.	Total.	Duty.	Certificate of dis- ability.	Died.	Discharged by order.	Dropped.	Expiration of serv- ice.	Deserted.	Remaining at last report.	Total.
			1			3	3								3
						4	1		3						4
	3			2		7	5	a 2							7
						4	4								4
						5	4	1							5
					1	1			1						1
	1					4	4								4
						10	8		2						10
						4	4								4
						9	1	1	7						9
						1	1	1							1
						5	5	5							5
						2	2	2							2
						3	2	2						1	3
						1	1	1							1
						9	6	3							9
						1			1						1
						1		1							1
						7	5			2					7
1						5	3	2							5
						1		1							1
	1					25	24	1							25
				3		10	6	4							10
1						45	32	12	1						45
		1	1	1		24	19	1	1		b 1			2	24
						1		1	1						1
						1		1	1						1
						2	1		1						2
						4	1	1				1		1	4
						22	19	1				2			22
						8	3	3						2	8
						16	14			1				2	16
						5	2						1	1	5
						3	2	1							3
2	5	1	2	6	2	258	182	35	19	3	1	3	1	9	258

a One discharged for insanity.
b Dropped as a general prisoner.

C.—All gunshot wounds (exclusive of deaths not on sick report).

Character and location of wound.	How received.				Nature of missile.						
	In action.	Not in action.			Total.	Krag-Jørgensen.	Mauser.	Remington.	Springfield.	Winchester.	Revolver.
		Accidental.	Suicidal.	Homicidal.							
Head:											
Flesh	1	3			4	1					
Fracture	1	3	1		5	1		1			1
Face:											
Flesh	2	6	1		7						
Fracture	1	2	2		6	2					2
Neck	1	5			6						
Spine, fracture		1			1						
Thorax:											
Non-penetrating	6	4			10	3		2			
Penetrating	3	3	1	1	13	7	2				3
Abdomen:											
Non-penetrating	2	4			6	2	1				1
Penetrating	1	6		3	10	2					4
Pelvis, fracture	1	1			2				1		
Back and hip, flesh	3	5			8	1		2			3
Perineum, genital and urinary organs	2	2			2						2
Shoulder, flesh	4	2	1		7	1	1	1			3
Clavicle or scapula, fracture	2	1			3	1		1			1
Shoulder joint	1				1		1				
Arm:											
Flesh	5	9			14	2	2	2			7
Fracture		1			1	1					
Elbow joint	2	1			3	2		1			
Forearm:											
Flesh	5	6	1		12	1	2	1			3
Fracture	1	4		1	6	2					2
Wrist joint		1			1	1					
Hand, flesh		25			25	5					9
Carpus and metacarpus, fracture		10			10	7			2		
Fingers, fracture	3	45			48	28					10
Hip joint											
Thigh:											
Flesh	16	24			40	5	3	8			15
Fracture, upper third		1			1	1					
Fracture, middle third				1	1	1					
Fracture, lower third	2	2			4		1	1			2
Knee joint		4			4						4
Leg:											
Flesh	5	22			27	2	1	2			15
Fracture	3	3			11	2		2			4
Ankle joint											
Foot, flesh	2	16			18	5				1	3
Tarsus and metatarsus, fracture	3	5			8	3	2				1
Toes, fracture	1	3			4	3					1
Total	76	240	7	6	329	94	16	25	3	1	103

C.—All gunshot wounds (exclusive of deaths not on sick report).

Nature of missile.											Disposition.									
Lantaca slug.	Missile not stated.	Shotgun.	Fragment of bullet.	Cannon.	Powder.	Jacket of bullet.	Blank cartridge.	Explosion of rifle.	Explosion of cartridge.	Explosion of primer.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Dropped.	Expiration of service.	Deserted.	Remaining at last report.	Total.
.....	1	.....	1	.....	.....	.....	.....	1	.....	.....	4	4	.....	.....	.....	.....	.....	.....	.....	4
.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	2	.....	3	.....	.....	.....	.....	.....	5
2	1	1	.....	.....	3	.....	.....	.....	2	.....	7	5	a2	.....	.....	.....	.....	.....	.....	7
.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	4	1	.....	.....	.....	.....	.....	1	6
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	6	5	1	.....	.....	.....	.....	.....	.....	6
1	1	2	.....	.....	.....	1	1	.....	.....	.....	10	9	.....	1	.....	.....	.....	.....	.....	10
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	8	1	4	.....	.....	.....	.....	.....	13
1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	6	.....	.....	.....	.....	.....	.....	.....	6
.....	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	1	1	8	.....	.....	.....	.....	.....	10
.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	.....	.....	.....	.....	.....	.....	.....	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	8	.....	.....	.....	.....	.....	.....	.....	8
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	.....	.....	.....	.....	1	.....	.....	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	5	.....	.....	.....	.....	.....	.....	.....	7
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	2	1	.....	.....	.....	.....	.....	.....	3
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	1
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14	11	3	.....	.....	.....	.....	.....	.....	14
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	3	.....	.....	.....	.....	.....	.....	3
.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	12	10	.....	.....	2	.....	.....	.....	.....	12
1	1	.....	.....	1	.....	.....	.....	.....	.....	.....	6	8	2	.....	.....	.....	.....	.....	.....	6
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	1
.....	4	1	1	.....	1	.....	.....	.....	.....	.....	25	24	1	.....	.....	.....	.....	.....	.....	25
.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	6	4	.....	.....	.....	.....	.....	.....	10
1	5	3	.....	1	.....	.....	.....	.....	.....	.....	48	35	12	1	.....	.....	.....	.....	.....	48
.....
2	4	.....	.....	.....	.....	.....	.....	1	1	1	40	30	4	1	.....	b1	.....	.....	4	40
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	2	.....	1	.....	.....	.....	.....	1	4
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	1	.....	.....	.....	.....	.....	.....	1	4
1	5	1	.....	.....	.....	.....	.....	.....	.....	.....	27	23	2	.....	.....	.....	2	.....	.....	27
.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	5	4	.....	.....	.....	.....	.....	2	11
.....
1	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	18	16	.....	.....	.....	.....	.....	.....	2	18
.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	4	1	.....	1	.....	.....	1	1	8
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	3	1	.....	.....	.....	.....	.....	1	4
11	47	8	2	2	5	1	1	2	6	2	329	236	47	23	3	1	4	1	14	329

a One case discharged for insanity.

b Dropped as general prisoner.

c Three deaths not included being the following cases from previous year: One perforating abdomen; one fracture of thigh, lower third; one penetrating knee joint.

D.—Gunshot wounds which terminated fatally (exclusive of deaths not on sick report).

Character and location of wound.	How received.					Nature of missile.								
	In action.	Not in action.				In action.				Not in action.				
		Accidental.	Suicidal.	Homicidal.	Total.	Manner.	Remington.	Krag-Jørgensen.	Lantaca slug.	Krag-Jørgensen.	Missile not stated.	Revolver.	Explosion of rifle.	Explosion of primer.
Head, fracture	2	1			a 3					1	1	1		3
Spine, fracture	1				b 1									1
Thorax:														
Non-penetrating	1				c 1		1							1
Penetrating	2	2			d 4	1		1	2					4
Abdomen, penetrating	1	4		4	e 9			1	2	2	4			9
Arm, fracture	1	1			f 1				1					1
Fingers, fracture	1				g 1						1			1
Thigh:														
Flesh	1				h 1							1		1
Fracture, upper third	1				i 1				1					1
Fracture, middle third				1	j 1				1					1
Fracture, lower third	1	1			k 2		1				1			2
Knee joint	1	1			l 1				1					1
Total	5	15	1	5	26	1	1	1	2	9	3	7	1	26

a In one case elevation of depressed fragment of skull.

b Head of friction primer penetrated vertebral canal, crushing the cord; death second day.

c Wounded January 13, 1902; died January 18, 1902, of traumatic pneumonia and suppurative pleurisy.

d In one case wounded May 2, 1902; excision of portion of seventh rib in axillary line for drainage July 24, 1902; died of empyema July 28, 1902.

e Laparotomy in two cases; one died of acute suppurative cerebro-spinal meningitis.

f Wounded June 13, 1902; amputation of arm at shoulder joint June 16, 1902; died June 17, 1902, of septicæmia and shock.

g Wounded June 14, 1902; septicæmia developed June 19, 1902; died July 7, 1902.

h Died of hemorrhage and shock.

i Died of surgical shock.

j Wounded March 8, 1902; amputation at hip joint March 31, 1902; died same day of surgical shock.

k One of these wounded October 16, 1901; amputation right thigh at middle third February 6, 1902; flaps reopened and 2½ inches of femur removed April 29, 1902; remaining portion of necrotic femur removed June 10, 1902; died same day. In the other case, wounded April 30, 1902; immediate amputation middle third left thigh; died same day of hemorrhage and shock.

l Wounded October 27, 1901; died January 30, 1902, of chronic septicæmia.

F.—Surgical operations for gunshot wounds.

Character and location of wound.	Operation.	Result.		
		Re-cov-ered.	Died.	Re-main-ing last re-port.
Head, fracture	Elevation of depressed fragment of skull .....	.....	1	.....
Face, flesh	Enucleation of eye	1	.....	.....
Neck, flesh	Tracheotomy	1	.....	.....
Thorax, penetrating	Bullet located by means of the X ray; removal from muscles of back.	1	.....	.....
Do.....	Wounded May 2, 1902; excision of portion of seventh rib in axillary line with drainage of empyemic cavity July 24, 1902.	.....	1	.....
Abdomen, penetrating	Laparotomy; intestinal wounds closed with Lembert sutures (2 perforations); abdominal cavity irrigated with normal saline solution.	1	.....	.....
Do.....	Laparotomy June 12, 1902, for exploration of intestines for perforation; July 9, 1902, acute suppurative cerebro-spinal meningitis developed.	.....	1	.....
Do.....	Laparotomy right inguinal region; removal of bullet and stitching of two superficial wounds of cecum.	1	.....	.....
Do.....	Laparotomy; sutures applied .....	.....	1	.....
Do.....	Laparotomy; abdomen at once opened, median line from ensiform cartilage to below umbilicus and two-thirds across right rectus; wound packed with gauze; abdomen closed with catgut; sterile gauze pad applied.	.....	1	.....
Pelvis, fracture	Removal of fragment of bone 1 by $\frac{1}{2}$ inch from crest of right ilium.	1	.....	.....
Do.....	Removal of piece of brass jacket of Remington ball from ramus of ischium; also fragments of bone; curettage.	1	.....	.....
Scapula, fracture	Bullet removed from muscles of back	1	.....	.....
Shoulder, joint	Feb. 23, 1902, incision for drainage; Feb. 27, 1902, curettage of bullet tract; Apr. 19, 1902, several small fragments of necrosed bone from head of humerus removed.	1	.....	.....
Arm, flesh	June 8, 1902, incision $1\frac{1}{2}$ inches long over course of median nerve; band of cicatricial tissue cut and hematoma evacuated; July 30, 1902, extirpation of sac of traumatic aneurism upper portion of brachial artery after ligation above and below.	1	.....	.....
Do.....	Operation for repair of musculo-spiral nerve	1	.....	.....
Do.....	Operation for false aneurism of the brachial artery; aneurism exposed and artery ligated above and below.	1	.....	.....
Arm, fracture	Amputation of arm at shoulder joint; died of septicemia.	.....	1	.....
Elbow joint	Incision and removal of sequestrum, lower end of humerus.	1	.....	.....
Do.....	Jan. 23, 1902, spiculae of bone removed from shaft of humerus, and internal condyle disarticulated; Feb. 6, 1902, joint explored, abscess incised, and arm immobilized.	1	.....	.....
Do.....	Resection of elbow; removal of olecranon process of ulna and lower third of shaft of humerus.	1	.....	.....
Forearm, fracture	Amputation of forearm, upper third	1	.....	.....
Do.....	Amputation of forearm, lower third	1	.....	.....
Do.....	Amputation 1 inch above wrist	1	.....	.....
Carpus and metacarpus fracture.	Operation for the correction of Dupuytren's contraction.	1	.....	.....
Do.....	Removal of third finger and corresponding metacarpal bone.	1	.....	.....
Do.....	Iron bolt $\frac{1}{2}$ inch diameter, $1\frac{1}{2}$ inches long, removed from between fourth and fifth metacarpal bones.	1	.....	.....
Do.....	Little finger and remaining fragments fifth metacarpal bone removed.	1	.....	.....
Do.....	Incision and removal of fragments of bone from third metacarpal.	1	.....	.....
Do.....	Fragments of bone removed from third metacarpal; external parts sutured.	1	.....	.....
Finger, fracture	Finger amputation	35	.....	.....
Thigh, flesh	Removal of bullet by incision	1	.....	.....
Do.....	Incision 1 inch long, apex Scarpa's triangle; extraction of iron rod $\frac{1}{2}$ by $1\frac{1}{2}$ inches.	1	.....	.....
Do.....	Removal of bullet and drainage of tract and space along Sartorius muscle.	1	.....	.....
Thigh, fracture, middle third.	Wounded June 4, 1901; amputation at the hip joint by Lewis's method slightly modified, July 7, 1902; Oct. 18, 1902, removal of fragment of bone; Dec. 18, 1902, removal of buried drainage tube.	1	.....	.....

E.—*Surgical operations for gunshot wounds.*

Nature of missile.									
Krag-Jørgensen.	Mauzer.	Remington.	Spring-field.	Revolver.	Lantacalug.	Shotgun.	Cannon.	Missile not stated.	Explosion of cartridge.
				1					
1				1					1
	1								
				1					
1									
								1	
								1	
								1	
			1						
		1							
	1			1					
	1								
1				1					
1									
1									
		1							
1									
1							1		
1							1		
1					1				
1									
								1	
1									
21				6		3	1	4	
	1				1				
				1					
1									

E.—*Surgical operations for gunshot wounds*—Continued.

Character and location of wound.	Operation.	Result.		
		Re- cov- ered.	Died.	Re- main- ing last re- port.
Thigh, fracture, middle third.	Wounded Mar. 3, 1902; amputation at hip joint Mar. 31, 1902; died same day of surgical shock.	.....	1	.....
Thigh, fracture, lower third.	Wounded Oct. 16, 1901; amputation of thigh, middle third, for necrosis, Feb. 5, 1902 (as noted in last annual report); Apr. 29, 1902, flaps severed and 2½ inches of femur removed and sinuses curetted; June 10, 1902, remaining portion of necrotic femur removed at hip joint; died June 10, 1902, of osteomyelitis.	.....	1	.....
Do.....	Aug. 15, 1902, wound enlarged and 9 small pieces of bone from shaft of femur and condyle removed, fragments coaptated, wound packed with bichlorid gauze and felt splints applied; Sept. 22, 1902, fenestrum cut through external surface of femur with chisel, liberating pus; Dec. 14, 1902, incision (through scar of former operation) 2½ inches long down to bone; 2 holes drilled through femur to cavity, holes ½ inch apart, intervening bone chiseled out, drainage tube inserted, and wound packed.	.....	.....	1
Do.....	Sinus opened and irrigated; spicula of bone removed	1	.....	.....
Do.....	Wounded Apr. 30, 1902; immediate amputation, middle third; died day of injury of hemorrhage and shock.	.....	1	.....
Leg, flesh.....	Incision 4 inches long median line posterior surface, part of gastrocnemius found to be broken down and removed. Drainage.	1	.....	.....
Do.....	Feb. 25, 1902, incision 3 inches long, outer margin of tendo Achilles, bullet probed for but not found; Aug. 6, 1902, bullet located by X ray between tibia and fibula, and removed.	1	.....	.....
Do.....	Removal of cast-iron slug, cuboidal in shape, 1 by 1½ inches.	1	.....	.....
Leg, fracture.....	Wounded Dec. 12, 1901; incision with removal of fragment of bullet and sequestrum of bone, Aug. 22, 1902.	.....	.....	1
Do.....	Incision and curettage.....	1	.....	.....
Do.....	Amputation of leg, middle third.....	1	.....	.....
Do.....	Amputation 4 inches below knee joint, lateral musculo-cutaneous flaps.	.....	.....	1
Do.....	May 9, 1902, entrance wound enlarged and counter opening made in front of fracture; July 22, 1902, piece of bone 1 inch long removed; Aug. 14, 1902, removal of bullet.	1	.....	.....
Tarsus and metatarsus, fracture.	Removal of second toe and corresponding metatarsal bone.	1	.....	.....
Toes, fracture.....	Amputation of great toe at metatarsophalangeal joint.	1	.....	.....
Total.....	.....	72	9	3

SURGICAL OPERATIONS FOR DISEASE AND INJURY.

During the calendar year 1902, 608 of the more important surgical operations were reported by medical officers of the Army as having been performed by them on officers and enlisted men, and the following list indicates what a highly creditable part the Medical Department is taking in modern surgical work.

Numerous minor procedures, such as operations for hemorrhoids, incisions for abscess, extirpation of buboes, circumcisions, etc., have not been included, nor does the list comprise those operations following gunshot wounds already noticed under that heading. Many important and some brilliant operations on civilians were performed by army surgeons, including a large amount of gynecological work, but do not appear in this enumeration.

Out of the 608 operations listed, 587 recovered and 21 died.

The radical operation for hernia is second on the list in frequency and is a regular procedure in suitable cases. A large number of medical officers have attained great skill in this special operation, and many valuable men who would otherwise be lost by discharge are annually saved to the service. No death occurred as a result of 152 operations for hernia during the year, but in one case an intercurrent attack of measles unfortunately resulted fatally.

Out of 268 cases of appendicitis operation was performed 84 times, with 5 deaths. All fatal results were in cases of a specially serious nature. One was operated upon during typhoid fever, one was complicated by tubercular peritonitis, a third operation disclosed gangrene of the cecum and two remaining fatal cases were of the acute suppurative variety. Four men were discharged after operation on certificates of disability, 3 by expiration of enlistment, and 72 were eventually returned to duty. Among these last there were 50 simple appendectomies, 7 where the diagnosis was "ulcerative appendicitis," in 10 formation of abscess, and in 5 acute gangrenous perforation.

The literature of appendicitis is so voluminous that it does not seem necessary to quote the special reports received of the above operations, but results shown are exceedingly satisfactory and compare favorably with the statistics of the leading surgeons of the country.

Other abdominal operations were 19 incisions for hepatic abscess, with 14 recoveries, 2 cholecystotomies, and 4 operations on the intestines for adhesion, strangulation, or fecal fistula.

The chest wall was incised for empyema on 9 occasions, with 5 resections of rib, 1 case resulting in death.

Thirty-four amputations for disease and injury other than gunshot were performed, 1 at the hip joint, 1 at the knee joint, 4 of the leg, 1 of the foot, 1 at the shoulder joint, 2 of the arm, and 24 fingers and toes. One patient died after amputation of the arm from traumatic gangrene, and 1 succumbed to shock following amputation at the hip joint for osteo-sarcoma.

The formidable operation of amputation at the hip joint was done in all three times during the year, once for disease and twice following gunshot, as follows:

I. U. S. Army general hospital, Presidio of San Francisco, Cal.; operator, Col. A. C. Girard, assistant surgeon-general, U. S. Army. J. W. S., corporal, Company A, Tenth Infantry. First noticed hard swelling right thigh, with pain referred to the knee joint, while a patient in the military hospital at Honolulu, Hawaii. Size

gradually increased. Upon examination a fixed tumor was defined attached to the femur at the upper third. Patient presented a cachectic appearance. Skiagraph showed spindle-shaped involvement of the shaft of the femur. Diagnosis of osteosarcoma of periosteal type was made and amputation at the hip joint performed January 8, 1902.

Lateral incision 6 inches in length was made over the great trochanter. Disarticulation effected and rubber tourniquet applied about the body, crossing anteriorly and posteriorly, and passed around the body. Skin flaps were dissected and amputation completed. Vessels ligated, sheaths of muscles sutured with catgut, and large rubber drainage tube was inserted laterally and skin closed with interrupted silkworm gut sutures.

Before operation the body and extremities were enveloped in cotton batting to maintain the body heat, and Esmarch's bandage was applied from head to foot. Patient suffered greatly from shock, requiring frequent hypodermatic stimulation during the operation and infusions of salt solution afterwards.

Patient died at 1.40 p. m., January 9, 1902, not recovering from surgical shock.

II. Manzanillo, Cuba; operator, Capt. W. H. Block, assistant surgeon, Volunteers. J. C., private, Troop M, Tenth Cavalry. The patient, a syphilitic undergoing treatment in hospital, absented himself without leave, obtained a carbine, and was terrorizing a saloon, when the sergeant of the guard, as the only way to disarm him, fired at him. The bullet (.30-caliber Krag-Jørgensen) fractured the femur at middle third and caused a very severe wound. This was March 3, 1902, and on March 31 amputation at the hip joint was performed. Death from shock resulted the same day.

III. U. S. Army general hospital, Washington Barracks, D. C.; operator, Maj. W. C. Borden, surgeon, U. S. Army. F. H., trumpeter, Troop C, Eighth Cavalry, was admitted to hospital June 17, 1902, suffering with ankylosis of the left hip and knee joints, deformity of the left hip joint, shortening of the limb, and suppurating wounds of left thigh, resulting from an accidental gunshot wound of the thigh at Fort Sill, Okla., June 4, 1901.

Amputation of the affected part at the hip joint was indicated, and on July 7, 1902, the operation was performed, Senn's method being employed. A long incision was made over the great trochanter and carried down to the bone. By means of the periosteal elevator and the knife the muscular attachments about the trochanters and the upper part of the shaft were severed, and by strong adduction the head of the bone was made to project from the incision. This was unusually difficult because of the deformity of the parts—the neck of the bone springing from the shaft at a right angle. It was found necessary to strongly rotate the thigh inward before the ligaments could be severed. The operator then introduced a stout pair of forceps, carrying the middle of a heavy rubber tube into the wound and gently pressed them through the tissues until they appeared beneath the skin on the internal surface of the thigh at the level of the lesser trochanter. The forceps were then removed, the middle of the tube cut, and the two pieces resulting were tied around the anterior and posterior flaps, respectively, both of these being on the inner side of the femur, which emerged from the wound and was not included in either flap. The amputation was completed by circular sweep of the catlin at the level of the lower extremity of the first incision. All vessels were ligated with kangaroo tendon, a few comminuted fragments of bone removed, the tubes removed, all bleeding checked, and the wound closed by silkworm gut sutures. Through-and-through drainage was secured by a small tube. The patient was much depressed after the operation, but rallied well and made a comparatively uneventful recovery. The drains were removed on the sixth day, and an attack of malaria, which developed on July 25, was promptly abated. A small fragment of bone was removed from the cicatrix on October 8, 1902.

Surgical operations, 1902.

Nature of operation.	Disease or Injury.	Recovered.	Died.	Remarks.
Removal of foreign bodies, bullets...	Old shot wounds	3	.....	Scapula 1, wrist 1, axilla 1.
Operations on the eye:				
Pterygium		10	.....
Cataract		1	.....
Strabismus		1	.....
Operations on the ear:				
Paracentesis	Otitis media 3, mastoiditis 1.	4	.....
Excision of bone	Otitis media	1	.....

Surgical operations, 1902—Continued.

Nature of operation.	Disease or injury.	Recovered.	Died.	Remarks.
Operations on the nose:				
Removal of polyp.....		1	.....
Restoration of bone.....	Old, depressed fracture	1	.....
Broadening.....	Saddle nose	2	.....	Paraffin prosthesis.
Operation on arteries: Ligation	Shot wound	1	.....	Radial artery.
Operations on veins:				
Varicocele		164	.....
Varicose veins		22	.....
Operations on respiratory organs:				
Tracheotomy		1	1	
Empyema		8	1	Resection fifth rib.
Operations on digestive organs:				
Herniotomy	Inguinal 148, scrotal 1, ventral 2, umbilical 1.	151	1	Death from measles.
Fistula in ano		18	.....
Hepatic abscesses.....		14	5	Incision and drainage.
Cholecystotomy		1	1	
Enterorrhaphy .....		.....	1	
Appendectomy		79	5	
Laparotomy	Intestinal adhesion 2, strangulated intestine, 1.	2	1	
Operations on urinary organs:				
Stricture of urethra.....		5	.....	Internal urethrotomy 4, external 1.
Nephrotomy	Nephritis.....	1	.....
Cystotomy	Pyelitis.....	.....	1	
Operation on generative organs:				
Removal of testicles	Traumatic 3, sarcoma 3, tuberculosis 3, gonorrhea 1.	10	.....
Amputation of penis.....	Epithelioma	1	.....
Hydrocele		4	.....
Operations on bones:				
Ununited fractures	Fractures, not shot.....	11	.....	Wiring.
Resection	Dislocation	1	.....	Ulna at wrist.
Trephining	Fracture, not shot.....	3	2	Parietal.
Removal of bone	Disease 14, injury 6.....	20	.....
Incision	Periostitis	1	.....	Head of tibia.
Operations on joints:				
Removal of loose bodies	Cartilage	2	.....	Knee joint 2.
Aspiration	Synovitis.....	2	.....	Do.
Incision	Arthritis	2	.....	Knee joint 1, elbow joint 1.
Operations on muscles: Tenotomy....	Deformity 3, injury 3.....	6	.....
Operations on limbs, amputation for injury:				
Leg	Frostbite 1, fracture 3	4	.....	Secondary.
Foot	Infected wound	1	.....	Hay's secondary.
Toe	Fractures 3, incised 1.....	4	.....
Shoulder joint	Fracture	1	.....	Secondary.
Arm	Fracture 1, dislocation 1.....	1	1	Primary 1, secondary 1.
Finger	Incised 4, laceration 5, fracture 5, infected wound 1.	15	.....	Primary 8, secondary 7.
Amputation for disease:				
Hip joint.....	Osteo-sarcoma .....	.....	1	
Knee joint.....	Periostitis	1	.....
Toes	Deformity 4, abscess 1.....	5	.....
Operations on skin, etc.: Skin grafting.	Indolent ulcer.....	1	.....

THE GENERAL HOSPITALS.

ARMY AND NAVY GENERAL HOSPITAL, HOT SPRINGS, ARK.

During the calendar year 1902 there were 32 officers admitted for treatment, of whom 22 were on the active list of the Army and 3 retired, 2 on the active list of the Navy and 3 retired, 1 officer of Philippine Scouts, and 1 from the Public Health and Marine-Hospital Service. In all, 372 cases were admitted, compared with 407 in 1901. They were classified as follows: Rheumatism in various forms, 222;

diseases of digestive system, 41; of nervous system, 15; of the kidneys, 6; malarial fever and cachexia, 14; other diseases, 74.

The construction of this hospital was begun in 1883 and completed in 1885. It remained as originally designed up to November, 1899, when an elaborate scheme for its reconstruction was matured and carried out by the commanding officer, Maj. George H. Torney, surgeon, U. S. Army, whereby the hospital was practically rebuilt.

The bath house of the hospital is a large one-story structure of the same general design as the other buildings, and is divided into two bathing establishments, one for officers and the other for enlisted men under treatment. The officers' bath occupies about one-third of the building and has, first, a dressing room, with five individual compartments and a lounging room; second, the bath proper, with four individual rooms, two vapor chambers, and a hot room, these are tiled and faced with marble throughout; third, the douche room, with all the appliances of a modern hydropathic establishment.

The baths for enlisted men occupy the remainder of the large building and are similar to the officers' baths, but on a larger scale. The grounds and roads of the institution are in perfect condition. The buildings are connected with wide galleries and surrounded by verandas which may be closed by glazed sashes in cold weather. There is an entirely modern kitchen and laundry, an ice machine, a steam-heating system, and an electric-light plant. Altogether this hospital, with a capacity of 130 beds, is as complete in every respect as the most elaborate institutions of like nature anywhere.

UNITED STATES GENERAL HOSPITAL, FORT BAYARD, N. MEX.

During the fiscal year ending June 30, 1903, 506 cases of tuberculosis were treated, of whom 150 cases were in the hospital June 30, 1902. Every patient is thoroughly examined, physically, at time of admission and at regular intervals thereafter; in all, 1,537 physical examinations are of record during the year.

SUMMARY OF CASES.

	Per cent.
Cases treated during the year	506
Cases in hospital June 30, 1902	150=29. 64
New and readmitted cases	356=70. 36
Cases discharged improved	157=31. 03
Cases discharged unimproved	73=14. 43
Cases remaining improved	124=24. 50
Cases remaining unimproved	89=17. 59
Deaths during the year	63=12. 45
Total number of cases improved	281=55. 53
Total number of cases unimproved	162=32. 02

Of the 356 cases, new and readmitted during the year, there were:

	Per cent.
Discharged improved	84=23. 59
Discharged unimproved	50=14. 04
Remaining improved	95=26. 69
Remaining unimproved	75=21. 06
Total improved	179=50. 27
Total unimproved	125=35. 11
Deaths	52=14. 60

Of the 150 cases in the hospital June 30, 1902, there were:

	Per cent.
Discharged improved.....	73=48. 67
Discharged unimproved	23=15. 33
Remaining improved.....	29=19. 33
Remaining unimproved.....	14= 9. 33
Total improved	102=68. 00
Total unimproved	37=24. 67
Deaths	11= 7. 33
Cases now remaining in hospital	213
Number showing improvement	124=58. 21
Number not showing improvement.....	89=41. 79

These figures are based upon the progress of lung lesions as shown by the physical examinations. Only cases in which the lesion is less than at the time of the first examination are recorded as improved. A large number of patients are received in whom the tubercular process has so far advanced that any improvement is impossible. Another large percentage of the patients admitted, who have their discharges on surgeon's certificate of disability, leave the hospital before they have been there a long enough time to secure more than slight benefit from the treatment received. Those who become beneficiaries of the United States Soldiers' Home are, under the rules of the Soldiers' Home, at liberty to leave the hospital and return at will. This allows many men who have begun to show improvement to leave the hospital and remain away until their condition is so bad that they are obliged to return for treatment. When they have again become slightly improved they are at liberty to again leave the hospital. These facts tend to neutralize the beneficial results which might otherwise be recorded as a result of treatment.

The report of the laboratory shows that 3,047 examinations of sputum were made, and tubercle bacilli found present in 936. No case entering the hospital is recorded as negative for tubercle bacilli until ten samples of sputum have been carefully examined. In negative cases if there is any expectoration persisting the examination is again repeated every two months during the patient's stay at the hospital.

During the year sputum was examined from 356 new and readmitted cases. Of these, 284 showed the presence of tubercle bacilli during the first 10 examinations of the sputum. In 67 cases the bacillus was not present, though the physical signs gave evidence of disease. In only 6 cases when the tubercle bacillus was not found during the first 10 examinations was it found subsequently. In but 5 of the cases where the bacillus was found during the first 10 examinations was it permanently absent from the sputum before the close of the year or before the patient was discharged from the hospital.

Five cases admitted to the hospital have had no expectoration.

Of the 150 patients remaining in hospital June 30, 1902, the tubercle bacillus could not be demonstrated in 30. In 120 it was present. In 4 of the cases in which the bacillus could not be found it was afterwards demonstrated. In 12 cases where it was present subsequent examinations failed to detect it.

Examinations of the urine to the number of 1,362 were made and 1,312 blood examinations. It is interesting to note that the average hemoglobin percentage as shown in 100 consecutive examinations is 90.3. This average, a higher one than is usually found among well per-

sons in ordinary life, is in part attributable to the altitude and climatic conditions, and in part to the regular manner of living and the character and quantity of food used by the patients. The numerical count of red blood corpuscles closely corresponds with the hemoglobin percentage.

Lieutenant-Colonel Comegys, deputy surgeon-general, U. S. Army, who has commanded the hospital since November, 1902, states his belief that consumption when treated early enough can either be cured or materially benefited by open-air life, generous diet, and regular habits.

U. S. ARMY GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C.

At this, which also serves as post hospital for Washington Barracks, 542 cases were treated during the fiscal year—377 medical and 165 surgical cases. In the surgical service 116 of the more important operations were performed, including 45 operations for hernia of various kinds and 14 appendectomies.

The work of construction at Washington Barracks, now well under way, will render the removal of the general hospital imperative in the near future. Plans for the War College and Engineer School contemplate a new building on the present site of the hospital. It has been proposed to move the present building and use it as a post hospital during the construction work, and for this purpose it is neither too large nor too good.

It is inadequate in size for a general hospital, however, and, being largely built of timber it has shrunk and settled until it is no longer possible to maintain it in the perfect sanitary condition absolutely necessary where aseptic operations are to be performed.

The building is about ten years old and cost less than \$40,000. It is always crowded, so that nurses must be lodged outside, and there are no private rooms for officers or special cases. The location is not suitable, even if it were possible to retain the site, as the ground is low and the heat excessive in summer.

The company of instruction of the Hospital Corps is quartered in temporary wooden pavilions, in bad repair, which were built during the war with Spain and are now worthless for any purpose.

I repeat most earnestly my previous recommendation that a general hospital of sufficient size and perfect in every respect be built in the District of Columbia for the following purposes:

First. Treatment of cases needing the services of specialists, surgical or other observation, and treatment of officers incapacitated for service prior to their appearance before retiring or examining boards.

Second. Training enlisted men of the Hospital Corps in nursing and military duties.

Third. Instruction at the Army Medical School in military surgery, hospital administration, Hospital Corps drill, and establishment of field hospitals.

Fourth. To serve as a nucleus around which, in time of war, temporary wards may be erected without delay to any extent and at minimum expense.

Sketch plans are now in course of preparation for such a hospital, the establishment of which means so much to the Medical Department

and the Army at large that it is hard to express the disappointment felt at the failure to obtain the requisite appropriations from the last Congress.

A conservative estimate of the money saved the United States by the successful surgical operations at this hospital since its establishment, September 8, 1898, to February 17, 1903, has been made, and it is shown that 31 officers completely incapacitated have been operated upon and restored to duty, whose retired pay would have been very nearly \$60,000 a year, and that 216 enlisted men have been returned to duty after operations for disability, whose pensions, had they been discharged, would have amounted to nearly \$28,000 a year. The institution has, therefore, already paid for itself many times over from its surgical work alone, while its value as an essential part of the instruction of young medical officers and enlisted men of the Hospital Corps can not be estimated.

U. S. ARMY GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL.

Because of the reduction of the size of the army in the Philippine Islands, and, in consequence, the decreasing number of sick who have returned to the United States, the demands on this hospital have diminished and are not so great to-day as they were a year ago. Instead of keeping several barracks in the Presidio proper as additional wards to the hospital, in which the overflow might be treated, two of these barracks have been given up and have been returned to their proper use for the permanent garrison of the Presidio. But a single ward has been retained and one barrack used as a dormitory for the Hospital Corps.

The hospital, with all its buildings, has been maintained in first-class repair from allotments that have been made from time to time, and the grounds around it have been kept up in a manner to add to the general appearance of the place. Economy has been practiced in every possible respect. The furnaces at the power plant have been relined; a No. 4 Wagner pump for the ice machine has been installed; the interior of one double set of officers' quarters has been repainted; three wooden buildings, used temporarily as storerooms, have been moved to clear the ground for the erection of a new storehouse, and two engines at the power plant have been overhauled and repaired. Repairs to the hot-water tank were made by the chief quartermaster of the department. The following are now in process of construction and should all be finished within the next six months: A new operating pavilion; an additional barrack for Hospital Corps, the exact counterpart of the building used for that purpose at present; a new surgical dressing room between wards D and E; a new storehouse for the accommodation of medical, quartermaster, and commissary supplies; a new large addition to the mortuary, in the shape of a strictly modern post-mortem room, and a new pathological, bacteriological, and chemical laboratory on the second floor of the administration building.

The following numerical statement shows the work of the hospital during the fiscal year:

Cause.	From Philippine Islands.	From posts in United States.	Total.
Remaining in hospital June 30, 1902	195	207	402
Total admissions during past year	1,856	1,168	3,024
For gunshot wounds	82	13	45
For diarrhea and dysentery	940	184	1,124
For malarial fever	106	58	163
For typhoid fever	16	16	32
For rheumatic affections	57	32	89
For venereal diseases	87	158	245
For alcoholism	5	9	14
For injuries	48	108	151
For insanity	81	17	98
All other causes	485	578	1,063
Total returned to duty	1,079	775	1,854
Rate per 1,000 of admissions	581.36	663.53	613.09
Total discharged for disability	254	115	369
Rate per 1,000 of admissions	136.85	98.46	122.08
Deaths from all causes	38	36	74
Rate per 1,000 of admissions	20.47	30.82	24.47
Desertions	44	14	58
Sent to Hospital for Insane, Washington	73	11	84
Sent to general hospital, Fort Bayard	78	22	95
Sent to general hospital, Hot Springs	88	16	54
Otherwise disposed of	319	280	599
Remaining in hospital June 30, 1903	188	106	259

Two hundred and twenty-one important surgical operations were performed, including 24 radical operations for hernia, all successful, 17 appendectomies with 1 death, and 13 operations for hepatic abscess; 8 in which the abscess was single recovered, 1 where the abscesses were multiple recovered and 4 died. The technique of these last operations by which such gratifying results were obtained is thus described by Maj. W. P. Kendall, surgeon, U. S. Army, commanding the hospital:

Having experienced difficulties at times in locating the abscess, and even failing altogether to find it, the method was finally adopted of making an exploratory incision upon the right side about an inch or an inch and a half below the border of the costal cartilage and parallel with it, of some 3 inches in extent. Through this it was possible to explore the liver thoroughly, and to determine its exact location. When situated upon the lower surface and easily reached, the abdominal cavity having been thoroughly walled off with gauze, the abscess was opened with an ordinary pair of hemostats, and drained through this incision. When, however, it was situated high or posteriorly, this exploratory incision was sewed up and an excision of the seventh rib in the anterior axillary line was made, through which, the capsule having been sewed to the wall, the abscess was opened, either with forceps or thermocautery, and with tube and gauze drained as in the other case.

In view of the fact that one multiple and all of the single abscesses were saved, the procedure seems to have been a good one. Of the 4 cases which died all were multiple abscesses, the number ranging from 3 to 30.

It is true that in this operation there is added to the thoracotomy the other operation of exploration, but it is a recognized fact that the theoretical exploration of the liver with a needle is often unavailing in the effort to locate the abscess, while through the incision mentioned it is easy to locate definitely its situation. It seems to be the scientific procedure, based, as it is, upon the certain knowledge of the operator of what he is doing. All operations in which he does not know this must be regarded with more or less suspicion. The practicability of draining an abscess from the under surface of the liver through this anterior incision after the abdomen has been walled off is an established fact, the reason for it being probably that such a large percentage of these abscesses are practically sterile.

There were treated 313 cases of disease of the eye, with 17 operations; 124 cases of disease of the ear, with 1 operation, and 268 affections of the nose and throat, with 37 operations. These were all hospital patients, but in addition 188 cases of these special troubles

were treated among officers, members of their families, etc., from the city and neighboring posts.

During the year 127 radiographs have been taken, and, while sometimes wanting in distinctness, they have proven of inestimable value in the diagnosis of fractures and in locating lodged foreign bodies.

In the pathological laboratory the following work has been done:

Examinations of blood.....	3,308
Examinations of urine.....	4,588
Examinations of feces.....	1,453
Examinations of sputa.....	1,186
Blood counts.....	548
Widal tests.....	68
Cultures for diphtheria.....	48
Malta fever tests.....	9
Feces for cholera spirillum.....	6
Sections of post-mortem material.....	254
Miscellaneous.....	35

Besides the above examinations, which were made during the routine work of the hospital, there were 512 examinations from outside sources, comprising the substations of the Presidio, surrounding stations, and department headquarters.

These examinations were divided as follows:

Examinations of blood.....	105
Examinations of urine.....	325
Examinations of sputa.....	32
Miscellaneous.....	50

Of the 1,453 specimens of feces examined, amebæ were found in 182, and the ova of uncinaria in 10.

In 7 autopsies on bodies of men dying with chronic amebic dysentery, liver abscesses were found as follows:

- Case 1.*—Six abscesses: Right lobe of liver, 5; left lobe, 1.
- Case 2.*—Two abscesses: Right lobe of liver, 2; left lobe, 0.
- Case 3.*—Seventeen abscesses: Right lobe of liver, 18; left lobe, 1.
- Case 4.*—Thirty abscesses: Right lobe of liver, 23; left lobe, 7.
- Case 5.*—Three abscesses: Right lobe of liver, 3; left lobe, 0.
- Case 6.*—Four abscesses: Right lobe of liver, 4; left lobe, 0.
- Case 7.*—One abscess between right and left lobes.

First Lieut. Charles F. Craig, assistant surgeon, U. S. Army, the pathologist of the hospital, also remarks:

One has only to glance at the above table to be impressed with the fact that most liver abscesses are situated primarily in the right lobe of the liver. Even in those cases which show multiple abscesses the right lobe showed a preponderance in number and also in the age of the abscess, thus proving that the primary starting point of abscess formation in these cases was in the right lobe. In every case showing abscess formation in the right lobe at least one abscess was found at the dome, and invariably these abscesses were the oldest ones present in the liver, as shown by the size and the greater thickness of the fibrous wall.

FIRST RESERVE HOSPITAL, MANILA, P. I.

This hospital was built by the Spanish authorities many years prior to the Spanish-American war, and can in no sense be considered a model of hospital construction, in which every essential detail should be supplied for the care and treatment of the sick of the Army in

accordance with modern methods, but is in fact a shabby substitute therefor. The floors are uneven, the joists rotten and ant-eaten, and the whole establishment infested with vermin. To remedy these conditions and make the hospital what it should be, the commanding officer forwarded estimates for the cementing of all floors, the removal of the roofs of the entire establishment, and the construction of a second story on the walls of the existing buildings, with lavatories, bath rooms, water-closets, and perfected sewerage system, kitchens, mess rooms, store rooms, etc. The estimated cost amounted to over a quarter of a million dollars. These estimates were forwarded by the chief surgeon of the division, recommending disapproval, as it seemed to him that there could be no economy in expending so much money in an effort to transform the shells of the old Spanish buildings into a modern hospital. Moreover, the site is not suitable for an establishment of the kind. It is low, poorly drained, and exposed to the dust and traffic of the busy streets which bound it on two sides. It answers its purpose temporarily, but is not a credit to the Medical Department of the Army. A well-equipped general hospital is necessary near Manila, and could be built at far less expense than that required for the reconstruction of the buildings now in use.

Meanwhile much-needed improvements have been made to the hospital, consisting chiefly of an addition to each of the seven wards and the installation therein of water-closets, urinals, slop sinks with suitable water and sewer connections, and the construction of a 6,000-gallon tank for the purpose of securing a constant supply of water during the morning hours, when the pressure in the city mains is reduced. Estimates were approved for modernizing and perfecting the operating room, for the installation of electric fans, for the construction of a sanitary chemical laboratory, for painting and whitewashing, and for the repairs and improvement of concrete sidewalks, gutters, roofs, etc.

The movement of sick through this hospital is shown in the following tabulation:

Patients July 1, 1902, to May 31, 1903.

In hospital July 1, 1902.....	255	
Cases received	3,587	
		3,842
Returned to duty.....	1,727	
Died	72	
Transferred to other hospitals.....	736	
Transferred to United States	973	
Discharged	14	
Otherwise disposed of	38	
		3,560
Remaining		282

Ward No. 1 constitutes the ophthalmological and nose and throat departments of the hospital, and during the period there were treated 378 cases, viz: Eye, 197; ear, 156; nose and throat, 25. In addition to these, a large number of out-patients were treated, as follows: Eye, 606; ear, 279; nose and throat, 287.

In the surgical ward 571 cases were admitted, and in 199 of them surgical intervention was necessary. Seven died, 2 from liver abscess, and 1 each from appendicitis, gunshot wound of the intestines, sar-

coma of the intestines, tuberculosis, and tetanus, while 370 were returned to duty. Among the more important surgical operations were 53 radical operations for hernia, with no death; 25 appendectomies, with 1 death, and 6 cases of liver abscess incised and drained, with 2 deaths.

In the dysentery ward 705 completed cases were recorded, 150 of these having been returned to duty, 301 transferred to the United States, 234 to other hospitals, while 20 ended fatally. Of the 503 cases of dysentery treated, 4 cases were specific dysentery, 238 amebic dysentery, and 261 cases from which neither clump reaction nor amebæ dysenteriae could be obtained. As there were but 4 cases of specific dysentery, and as the patients came from all parts of the islands, it may be said that except for sporadic cases the Philippines have been free from this disease during the past year.

The pathological and bacteriological work of the hospital was conducted in the most satisfactory way by Lieut. Herbert M. Smith, assistant surgeon, U. S. Army. It included the following:

Blood examinations	1, 117
Positive as follows:	
Tertian malaria (ordinary)	142
Estivo-autumnal malaria	76
Hemoglobin estimations	18
Serum reaction Malta fever	3
Serum reaction typhoid fever	16
Serum reaction specific dysentery	8
White blood count	247
Red blood count	69
Differential count	25
Urine examinations	1, 031
Positive as follows:	
Albumen	229
Sugar	68
Casts, leukocyte	19
Casts, red blood corpuscles	11
Casts, hyaline	118
Casts, granular	71
Casts, epithelial	12
Casts, mixed	11
Urea determinations	43
Dialo reactions	21
Gonococci	26
Sputum examinations	550
Positive as follows:	
Tubercle bacilli	97
Micrococcus lanceolatus	20
Miscellaneous	100
Stool examinations	2, 088
Positive as follows:	
Ameba dysenteriae	574
Ameba coli	99
Ameba dysenteriae and ameba coli	14
Uncinaria duodenalis	82
Trichuris trichiura	94
Ascaris lumbricoides	42
Tenia saginata	3
Strongyloides intestinalis	10
Vibrio cholerae Asiaticæ	7
Pus examinations	78
Positive as follows:	
Eye, gonococcus	8
Urethra, gonococcus	7
Knee joint, staphylococcus pyogenes albus	1
Carbuncle, streptococcus pyogenes	1
Liver abscess, ameba dysenteriae (out of 8)	1

Water examinations, bacteriological, complete.....	50
As follows:	
Quartermaster's distilling plants, Manila.....	16
Water boat Charleston.....	2
First Reserve Hospital distilling plant.....	21
Artesian well insular ice plant.....	2
Malate Barracks distilling apparatus.....	4
Artesian well, Bayambang.....	3
Artesian well, Fort McKinley.....	2
Tissue examinations, clinical. Tissues from the surgical operating rooms are all examined and fully reported upon.	
Necropsies.....	66

Full pathological and bacteriological reports with microscopical diagnoses are made in each case and embodied in the monthly report of sick and wounded of the hospital:

During the dengue epidemic, July to October, 1902, numerous fresh-blood preparations and blood cultures were made from the dengue-fever patients, all giving uniformly negative results.

At the request of Capt. E. L. Munson, assistant surgeon, U. S. Army, board of health, Manila, with a view of finding a safe solution for disinfection of fruits in the Manila markets, experiments were made with cholera cultures to determine the lowest safe percentage of hydrochloric-acid solution required to destroy this organism with an exposure of about two minutes. The test showed that a seven-tenths per cent solution would destroy the organisms in the time desired.

At the request of the Surgeon-General, experiments were made with cholera-infected water to determine the efficiency of the Forbes water sterilizer. Water heavily charged with fresh cultures of the cholera spirillum was passed through the sterilizer and numerous cultures were made of the water discharged. In no instance was the cholera organism present in the sterilized water. Only the hay bacillus was recovered.

The work of the sanitary chemical laboratory has been conducted since February, 1903, by Lieut. Robert Smart, assistant surgeon, U. S. Army. The laboratory was established in one end of one of the storehouses of the medical supply depot adjoining the hospital, but owing to changes ordered in the location of buildings of this depot the laboratory had to be discontinued March 20, 1903. Estimates have been approved for a building on the grounds of the hospital to be used as a chemical laboratory. During the short period of its installation in the medical supply depot 42 water analyses were made, among which were water samples from Fort William McKinley, post of Manila; Batangas, Batangas; Calumpit, Bulacan; Camp Jossman, Guimaras; Camp Gregg, Bayambang, Pangasinan; Camp Morrison, Salomague, Ilocos Sur; and Pasay Barracks, Manila. An analysis of the water supply of the city of Manila was made twice a week and the report transmitted to the commissioner of public health for his information. Four samples of milk were analyzed—human, 2; condensed, 2. Two samples of commissary jam were submitted as having been the probable cause of lead poisoning in the cases of soldiers using them, and one examination of a stomach and contents for suspected alkaloidal poisoning was made.

HOSPITAL NO. 4, MANILA, P. I.

Hospital No. 4 was established April 3, 1902, in some unoccupied buildings at Santa Mesa Barracks, but on April 20 was transferred to hospital tents near the smallpox hospital, the two constituting a contagious disease hospital for the troops in and in the neighborhood of the city of Manila. It consists of a large frame nipa-roofed building and 14 hospital tents. The former is divided into 2 wards of 20 beds each and 2 small rooms, one of which is used as a dispensary and the other as a laboratory. The kitchen and dining room are housed in a small frame building with galvanized-iron roof. The tents accommodate the hospital staff and cases of contagious diseases.

The cases treated during the eleven months ended May 31, 1903, were as follows:

	Cases treated.	Recovered.	Died.
OFFICERS.			
Variola.....	1	1	.....
Cholera.....	1	.....	1
ENLISTED MEN.			
Cholera.....	80	48	37
Cholera morbus.....	1	1	.....
Variola.....	4	3	1
Measles.....	1	1	.....
Dysentery.....	2	2	.....
Diarrhea.....	18	18	.....
Sprue.....	1	1	.....
Gastro-enteritis.....	3	3	.....
Dyspepsia.....	12	12	.....
Malaria.....	1	1	.....
Parotitis.....	1	1	.....
CIVILIANS.			
Cholera.....	14	7	7
Variola.....	1	1	.....
Dyspepsia.....	1	1	.....
Diarrhea.....	4	4	.....

All except the other contagious diseases were sent to this hospital as cholera or suspected cases of cholera. The cases of measles and mumps were imported from the United States on the transport *Thomas*. The cases of smallpox gave the members of the hospital corps an opportunity to show their mettle. They displayed the devotion to duty which is characteristic of high-class men. According to First Lieut. William W. Reno, assistant surgeon, U. S. Army, sundry experiments were tried to avert or ameliorate the dangerous pustular stage of the disease, with partial success. The best method found was to evacuate the vesicle and irrigate often with a weak corrosive-sublimate solution. When large areas are treated it is necessary to apply bandages freely to protect the parts. Evacuation of the pustule was of no benefit whatever, except after the pus had become caseous. At that time evacuation seemed to hasten the disappearance of the lesion. Remedial agents directed against pitting were of no avail. In 3 cases the pitting was general and pronounced, and in 2 cases there were no pits. Of the 6 cases of smallpox 5 had not been successfully vaccinated in years, and the sixth was uncertain.

STATISTICAL TABLES.

The following statistical tables give in detail the data on which the statements of this report are based. They are:

I. Numerical view of the effects of disease and injury on United States troops performing insular and home service in 1902, compared with corresponding data for 1901 and for the decade 1891-1900.

II. Monthly mortality and prevalence of disease in the Army at home and on insular service.

III. Admissions to sick report, discharges, and deaths in the Army, with ratios per thousand of mean strength for the year 1902, the decade 1891-1900, and by races.

(a) Army, 1902.
Decade, 1891-1900.

(b) White troops.
Colored troops.
Philippine Scouts.

IV. Admissions to sick report, discharges, and deaths in the Army, with ratios per thousand of mean strength for the year 1902, at home and on insular service.

United States (continental).
Pacific islands.
Cuba and Porto Rico.

V. Admissions to sick report, discharges, and deaths in the Army, with ratios per thousand of mean strength for the year 1902, by arms of service.

(a) Infantry.
Cavalry.
Artillery.
(b) Engineers.
Ordnance.
Signal Corps.
(c) Medical Corps.
Philippine Scouts.
Others.

INTERNATIONAL TABLES.

I. Examination of recruits during the year 1902.

III. Movements of sick, by branches of military service and by months, 1902.

VI. Admissions of important diseases, by branches of military service, 1902.

VII. Admissions of important diseases, by months.

TABLE I.—Numerical view of the effect of disease and injury on United States troops performing insular and home service in the year 1902, compared with corresponding data for the year 1901, and for the decade 1891–1900.

	U. S. Army, year 1902 and comparisons with 1901.						U. S. Army, decade, 1891-1900.	
	Cuba and Porto Rico.	Pacific Islands and China.	Total Islands and China.	United States (con- tinental).	Total U. S. Army.	White troops.	Colored troops.	Filipino troops.
Mean strength	8,274	37,768	41,042	39,736	80,778	71,679	4,273	4,886
Total admissions to sick report	4,257	81,003	85,260	53,396	138,656	122,306	8,109	8,239
Per 1,000 of mean strength	1,300.24	2,144.75	2,077.38	1,343.77	1,716.51	1,706.33	1,977.74	1,707.21
Admissions for disease	1,523.57	1,928.14	1,888.59	1,550.26	1,791.59	1,787.06	1,845.96	1,845.96
Per 1,000 of mean strength	8,416	76,228	78,644	43,677	122,821	107,174	7,279	7,963
Admissions for injury	1,043.87	1,991.84	1,916.18	1,099.18	1,514.29	1,459.19	1,708.49	1,489.44
Per 1,000 of previous year	1,208.22	1,775.75	1,720.26	1,300.17	1,599.82	1,596.18	1,643.67	1,680.34
Admissions for injury	841	6,775	6,615	9,719	16,335	15,134	1,380	371
Per 1,000 of mean strength	256.87	182.91	181.20	244.00	202.22	211.14	194.25	89,377
Per 1,000 of previous year	315.35	152.39	168.83	250.08	191.77	190.88	202.27	89,377
Discharges for disability—all causes	66	641	607	1,277	1,884	1,757	114	7,133
Per 1,000 of mean strength	20.16	14.33	14.79	32.14	23.32	24.51	26.63	17.63
Per 1,000 of previous year	14.57	13.71	13.79	35.26	19.96	20.47	13.74	17.63
Discharges for disease	58	461	519	1,079	1,596	1,452	107	5,574
Per 1,000 of mean strength	17.72	12.21	12.65	27.15	19.78	20.68	25.04	13.78
Per 1,000 of previous year	12.09	9.64	9.88	29.64	15.55	16.96	10.87	1.86
Discharges for injury	8	80	88	196	286	275	7	4
Per 1,000 of mean strength	2.44	2.12	2.14	4.98	3.54	3.83	1.64	0.88
Per 1,000 of previous year	2.43	4.07	3.91	5.62	4.40	4.49	3.36	1,559
Deaths from all causes	22	913	940	311	1,251	1,082	108	5,960
Per 1,000 of mean strength	6.72	24.31	22.90	7.83	15.49	14.40	24.11	14.73
Per 1,000 of previous year	5.74	17.96	16.76	6.90	13.94	13.75	16.12	4,223
Deaths from disease	11	796	807	225	1,032	893	87	109
Per 1,000 of mean strength	3.36	21.08	19.66	5.65	12.78	11.66	20.36	10.45
Per 1,000 of previous year	3.72	12.40	11.55	4.68	9.58	9.23	13.18	10.45
Deaths from injury	11	122	133	86	219	193	16	7
Per 1,000 of mean strength	3.36	3.23	3.24	2.16	2.71	2.74	3.76	1,732
Per 1,000 of previous year	2.02	5.56	5.21	2.23	4.86	4.46	2.94	1.45

TABLE II.—*Monthly mortality and prevalence of disease in the Army at home and on insular service, for 1902.*

Months.	United States (continental).				Pacific Islands.				Cuba and Porto Rico.				Army.			
	Ratios per 1,000 of mean strength.				Ratios per 1,000 of mean strength.				Ratios per 1,000 of mean strength.				Ratios per 1,000 of mean strength.			
	Mean strength.	Admissions.	Deaths.	Constantly sick.	Mean strength.	Admissions.	Deaths.	Constantly sick.	Mean strength.	Admissions.	Deaths.	Constantly sick.	Mean strength.	Admissions.	Deaths.	Constantly sick.
1902.																
January.....	33,608	121.82	0.45	60.02	48,898	160.27	1.85	59.85	6,070	105.27	0.33	47.44	88,576	141.90	0.95	59.06
February.....	33,752	115.67	.77	64.29	47,251	138.20	1.21	61.91	5,954	76.69	.50	37.78	86,967	125.17	.99	61.18
March.....	33,647	119.10	.69	50.92	46,622	149.50	1.49	63.80	5,417	92.67	.74	40.54	84,686	133.92	1.20	58.48
April.....	33,860	120.42	.42	57.84	44,771	168.49	1.66	61.11	4,663	102.80	.....	35.67	82,794	145.89	1.06	58.86
May.....	33,924	119.22	.60	50.01	43,802	133.77	1.99	64.38	2,518	102.38	.....	47.86	81,744	168.32	1.27	57.54
June.....	33,198	111.61	.79	47.94	40,827	205.65	2.95	70.49	2,065	132.35	.....	55.82	80,580	169.17	1.86	59.40
July.....	40,402	114.66	.69	47.78	37,861	226.64	3.24	75.24	2,140	122.90	1.87	54.42	79,903	167.22	1.91	60.76
August.....	44,094	119.06	.66	50.66	33,616	207.73	3.12	79.43	2,144	116.14	1.40	50.06	79,764	166.32	1.72	62.72
September.....	45,784	107.50	.67	50.77	31,259	131.13	2.57	82.27	2,128	132.95	.94	54.04	79,191	137.44	1.34	63.26
October.....	47,226	102.94	.87	50.83	29,602	176.99	1.76	76.83	2,181	119.21	.92	52.91	73,919	180.69	1.20	60.57
November.....	45,752	102.36	.57	54.39	26,065	199.47	2.42	82.19	2,167	128.75	.46	51.07	73,994	137.47	1.22	64.06
December.....	45,176	99.85	.60	50.86	25,171	166.86	1.47	73.71	1,865	140.17	.54	64.81	72,202	124.25	.90	53.84
Total.....	39,796	1,343.77	7.83	53.34	27,768	2,144.75	24.31	68.82	3,274	1,300.24	6.72	46.18	80,778	1,716.51	15.49	60.27

a Cholera epidemic began March 20.

TABLE III (a).—Admissions to sick report, discharges, and deaths in the Army, with ratios per 1,000 of mean strength, for the decade 1891-1900, the year 1902, and by race.

	U. S. Army, decade 1891-1900.						U. S. Army, year 1902.					
	40,446						80,778					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Mean strength.....												
Scarlet fever.....	58	0.14			4	0.01	18	0.22			1	0.01
Measles.....	4,411	10.91	3	0.01	47	.12	1,164	14.41			28	.35
Smallpox.....	14,429	36.23	2	.004	146	.87	2,106	1.80			14	.17
Vaccinia.....	17,840	42.87	1	.002	48	.11	1,048	24.80				
Influenza.....	5,364	13.26					6,492	12.97				
Dengue.....	2,927	7.24					1,276	15.80				
Diphtheria.....	223	0.55			9	.02	21	.28			1	.01
Typhoid fever.....	7,574	18.72	36	.09	901	2.28	568	6.99	1	0.01	69	.85
Cholera, Asiatica.....	1,012	2.50			188	.89	488	6.00			286	3.54
Beri-beri.....												
Cerebro-spinal fever.....	108	.28	10	.02	62	.15	628	7.75	4	.06	32	.40
Malarial fever, intermittent.....	117,690	290.98	12	.04	9	.02	18,410	227.91	1	.01	5	.06
Malarial fever, remittent.....	82,520	79.95	6	.01	107	.26	8,098	38.35	2	.02		
Malarial fever, pernicious.....	7,089	17.45	1	.002	203	.50	88	.47			7	.09
Malarial cachexia.....	7,521	18.49	154	.38	9	.02	400	5.57	4	.06	21	.28
Fever, undetermined.....	461	1.15			13	.03	1,107	18.70			8	.10
Erysipelas.....	2,153	5.38	2	.004	37	.09	13	.14			1	.01
Septicæmia and tetanus.....	1,467	3.43	20	.06	5	.01	10	.13	7	.09	9	.11
Rheumatic fever.....	8,438	20.85	611	1.51	248	.60	821	4.38	196	2.40	1	.01
Consumption.....	87	.22	11	.04	29	.07	31	.39	2	.02	69	.85
Cancer.....	5,269	13.08	488	1.21	14	.03	1,807	22.37	271	2.74	2	.02
Syphilis and results.....	25,110	62.08	128	.32	1	.002	8,609	104.58	84	1.04	1	.01
Gonorrhea and results.....	9,514	23.52	17	.04	1	.002	2,584	31.98	4	.05		
Chancroid and results.....	851	2.10	26	.06	28	.07	44	.54	10	.12	7	.09
Infectious, Others.....												
Total infectious diseases.....	264,090	652.94	1,521	3.76	2,098	5.17	50,820	623.13	586	6.83	562	6.96
Anæmia.....	1,116	2.76	23	.06	12	.03	180	2.28	6	.07	5	.06
Nutrition, Others.....	400	.99	135	.33	11	.03	84	1.04	48	.58	2	.02
Total diseases of nutrition.....	1,516	3.75	158	.39	23	.06	264	3.27	49	.61	7	.09
Alcoholism.....	9,125	22.56	18	.04	91	.22	1,890	22.65	7	.09	24	.30
Brain and spinal cord.....	2,385	5.77	810	.77	84	.21	1,266	8.17	85	1.06	14	.17
Insanity.....	687	1.70	455	1.12	8	.02	138	1.71	151	1.87	3	.04

Meningitis.....	68	.16	4	.01	21	.05	8	.10	6	.07
Poisoning, narcotic.....	298	.03	13	.03	37	.09	68	.76	11	.14
Nervous system, others.....	11,016	27.23	235	.58	18	.04	1,621	20.07	53	.01
Total diseases of the nervous system.....	23,435	57.94	1,085	2.56	259	.64	3,916	48.48	306	.73
Poisoning, irritant.....	586	1.45	2	.004	48	.12	286	2.92	8	.10
Tonsillitis, pharyngitis, and sore throat.....	21,893	53.97	.....	.....	2	.004	4,503	55.73	1	.01
Peritonitis, colic, and constipation.....	1,101	.25	4	.01	38	.09	25	.81	13	.16
Dyspepsia, colic, and constipation.....	27,927	69.04	86	.09	10	.004	5,958	73.70	.....	.....
Gastritis.....	6,678	16.51	39	.10	15	.05	2,295	28.41	8	.04
Dysentery, acute.....	6,339	15.67	7	.02	229	.57	3,146	38.96	10	.06
Dysentery, chronic.....	8,180	7.86	111	.27	336	.83	2,063	25.08	80	1.06
Diarrhœal diseases, others.....	93,914	232.20	151	.37	843	.85	17,063	211.48	97	1.22
Enteritis.....	3,245	8.02	27	.07	117	.13	1,113	13.73	14	.16
Perityphlitis and appendicitis.....	633	1.61	28	.06	53	.13	288	3.82	10	.12
Digestive system, others.....	13,643	33.73	123	.30	104	.26	2,974	36.82	15	.19
Total diseases of the digestive system.....	178,095	440.84	523	1.29	1,241	3.07	39,465	488.56	165	2.04
Heart, diseases of.....	1,928	4.77	434	1.07	154	.38	511	6.33	135	1.67
Arteries and veins.....	638	1.58	106	.26	30	.07	130	1.61	11	.14
Total diseases of the circulatory system.....	2,566	6.34	540	1.33	184	.45	641	7.93	146	1.81
Bronchitis.....	25,956	64.17	41	.10	4	.01	4,816	59.62	9	.11
Pneumonia.....	1,415	3.50	16	.04	228	.46	276	3.42	1	.01
Pleurisy.....	1,189	2.94	41	.10	13	.03	323	4.00	12	.15
Respiratory system, others.....	11,319	27.98	79	.20	27	.07	1,797	22.25	16	.20
Total diseases of the respiratory system.....	39,879	98.59	177	.44	272	.67	7,212	89.28	38	.47
Kidneys, diseases of.....	982	2.30	89	.22	121	.30	246	3.05	25	.31
Varicocele.....	919	2.27	60	.15	302	.74	302	3.74	8	.10
Genito-urinary, others.....	3,449	8.53	80	.20	3	.01	1,065	13.18	17	.21
Total diseases of the genito-urinary system.....	5,300	13.10	229	.57	124	.31	1,613	19.97	50	.62
Adenitis.....	1,933	4.78	13	.03	.....	.....	510	6.31	2	.02
Lymphatic system, others.....	309	.76	9	.02	3	.01	84	1.04	2	.02
Total diseases of the lymphatic system.....	2,242	5.54	22	.06	3	.01	594	7.35	4	.05
Rheumatism, muscular.....	18,976	46.91	147	.36	.....	.....	2,780	34.42	10	.12
Osteitis and periostitis.....	524	1.30	35	.09	.....	.....	117	1.45	9	.11
Arthritis and synovitis.....	2,488	6.15	132	.33	1	.002	883	10.93	39	.48
Rheumatism, chronic articular.....	3,579	8.68	1	.002	1	.002	456	5.64	28	.35
Muscles, bones, and joints, others.....	1,447	3.58	146	.36	1	.002	306	3.79	43	.53
Total diseases of the muscles, bones, and joints.....	27,014	66.79	728	1.80	3	.01	4,542	56.23	129	1.60

TABLE III (a).—Admissions to sick report, discharges, and deaths in the Army, with ratios per 1,000 of mean strength, for the decade 1891-1900, the year 1902, and by races—Continued.

Mean strength.....	U. S. Army, decade 1891-1900.						U. S. Army, year 1902.					
	40,446.			80,778.								
	Admissions.			Discharges.			Deaths.			Admissions.		
Causes of admission to sick report.	Ratio.		Number.		Ratio.		Number.		Ratio.		Number.	
	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.
Total diseases of the integumentary system.....	111.08	44,927	0.13	52	0.01	5	182.41	10,696	0.09	7	1,082	12.78
Total diseases of the eye.....	14.90	6,029	.73	297	.....	6	16.70	1,349	.96	77	49	61
Total diseases of the ear.....	9.71	3,926	.64	258	.....	1	12.87	1,999	1.05	85	1	0.01
Total diseases of the nose.....	1.34	544	.07	30	.....	1	1.81	106	.06	5	.....	.....
Total unclassified and undiagnosed.....	7.06	2,854	.01	4	.....	14	1.29	104	.01	1	.....	.....
Total for diseases.....	1,489.44	602,417	18.78	5,574	10.45	4,228	1,514.29	122,321	19.78	1,598	1,082	12.78
Drowning.....	.....	7	.....	.....	.....	318	.....	1	.....	.....	49	61
Exhaustion from exposure and fatigue.....	5.21	2,109	.01	8	.79	15	1.39	112	.....	.....	1	0.01
Heat stroke.....	2.28	924	.04	16	.05	21	1.06	85	.....	.....	.....	.....
Lightning stroke.....	.....	21	.....	.....	.....	5	.....	2	.....	.....	.....	.....
Venomous bites, stings, and wounds.....	4.72	1,908	.01	6	.01	1	6.62	535	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds.....	20.16	8,155	.02	2	.002	1	21.16	1,709	.01	1	.....	.....
Compression and concussion of brain.....	53	213	.02	8	.....	23	.....	50	.....	.....	2	.02
Contusions and sprains.....	100.94	40,827	.14	55	.01	4	98.78	7,575	.....	.....	4	.05
Dislocations.....	2.52	1,018	.07	27	.....	1	.....	11	.....	.....	.....	.....
Fractures (not shot).....	6.78	2,741	.40	161	.02	56	8.02	244	.....	.....	3	.04
Herniae.....	4.38	1,773	.99	401	.004	2	9.11	786	.....	.....	26	.31
Wounds, contused, lacerated, and punctured.....	27.61	11,168	.10	41	.....	10	27.11	2,191	.....	.....	8	.04
Wounds, incised.....	13.94	5,637	.07	28	.02	82	14.82	1,197	.....	.....	100	1.24
Wounds, gunshot.....	10.23	4,187	.50	607	.....	1,063	4.66	329	.....	.....	.....	.....
Secondary results of injury.....	2.85	1,151	.38	186	.01	8	.....	876	.....	.....	.....	.....
Other injuries.....	18.76	7,588	.17	69	.31	127	10.80	882	.....	.....	20	.25
Total for injuries.....	230.98	89,377	3.85	1,599	4.28	1,752	292.22	16,385	8.54	286	219	2.71
Total for diseases and injuries.....	1,710.43	691,794	17.63	7,183	14.73	5,980	1,716.51	138,696	23.82	1,884	1,251	15.49

TABLE III (b).—Admissions to sick report, discharges, and deaths in the Army, with ratios per 1,000 of mean strength, for the year 1902—Continued.

	White troops.				Colored troops.				Philippine Scouts (native).			
	71,678.				4,273.				4,826.			
	Admissions.	Discharges.	Deaths.	Ratio.	Admissions.	Discharges.	Deaths.	Ratio.	Admissions.	Discharges.	Deaths.	Ratio.
Causes of admission to sick report.												
	Number.	Number.	Number.	Ratio.	Number.	Number.	Number.	Ratio.	Number.	Number.	Number.	Ratio.
Alcoholism.....	1,777	24.78	6	0.06	50	11.70	1	0.23	8	0.62	1	0.21
Brain and spinal cord.....	287	3.81	79	1.10	17	3.96	5	1.17	2	.41	1	.21
Insanity.....	125	1.74	188	1.93	9	2.11	11	2.57	4	.83	2	.41
Meningitis.....	6	.08	3	.04	.....	.....	.....	.....	2	.41	1	.21
Poisoning, narcotic.....	61	.85	10	.14	1	.23	.....	.....	.....	.....	.....	.....
Nervous system, others.....	1,457	20.33	52	.73	104	24.34	1	.23	60	12.43	.....	.....
Total diseases of the nervous system.....	3,663	51.10	285	3.98	181	42.86	18	4.21	72	14.92	3	.62
Poisoning, irritant.....	227	3.17	.....	.....	8	1.87	.....	.....	1	.21	.....	.....
Tonsillitis, pharyngitis, and sore throat.....	4,168	57.94	.....	.....	826	76.80	1	.23	24	4.97	.....	.....
Peritonitis.....	23	.32	1	.01	1	.23	.....	.....	1	.21	1	.21
Dyspepsia, cholera, and constipation.....	5,314	74.14	3	.04	429	100.40	.....	.....	215	44.55	.....	.....
Gastritis.....	2,070	28.86	8	.11	148	34.64	3	.70	109	22.89	2	.41
Dysentery, acute.....	2,877	40.14	7	.10	160	87.45	4	.94	77	16.96	2	.41
Dysentery, chronic.....	1,769	24.63	90	1.25	86	20.13	7	1.64	109	22.89	2	.41
Diarrheal diseases, others.....	15,724	219.37	12	.17	864	206.88	2	.47	475	98.43	.....	.....
Enteritis.....	1,046	14.69	1	.06	40	9.36	.....	.....	27	5.69	.....	.....
Perityphlitis and appendicitis.....	2,259	31.61	15	.21	6	1.40	.....	.....	8	1.66	.....	.....
Digestive system, others.....	2,683	37.57	12	.17	203	47.31	3	.70	78	16.16	1	.21
Total diseases of the digestive system.....	36,155	504.40	153	2.13	2,291	586.16	12	2.81	1,019	211.15	6	1.24
Heart, diseases of.....	470	6.55	129	1.80	31	7.25	6	1.40	10	2.07	3	.62
Arteries and veins.....	126	1.76	11	.15	2	.47	.....	.....	2	.41	.....	.....
Total diseases of the circulatory system.....	596	8.31	140	1.95	33	7.72	6	1.40	12	2.49	3	.62
Bronchitis.....	4,353	60.78	9	.13	264	61.70	.....	.....	199	41.24	.....	.....
Pneumonia.....	225	3.14	1	.01	80	7.02	8	1.87	21	4.35	2	.41
Pleurisy.....	249	3.47	11	.15	16	3.74	1	.23	8	1.64	.....	.....
Respiratory system, others.....	1,664	23.10	16	.22	92	21.13	.....	.....	49	10.15	.....	.....
Total diseases of the respiratory system.....	6,583	91.14	37	.52	402	94.08	1	.23	277	57.40	2	.41

Kidneys, diseases of.....	283	8.26	21	.29	84	.47	9	2.11	8	.70	1	.28	4	.88	1	.21	1	.21
Varicocele.....	297	4.14	8	.11			5	1.17										
Genito-urinary, others.....	971	13.55	17	.24	2	.08	59	13.81					36	7.25				
Total diseases of the genito-urinary system.....	1,501	20.94	46	.64	86	.50	78	17.08	3	.70	1	.28	39	8.08	1	.21	1	.21
Adenitis.....	427	5.96					71	16.62	2	.47			12	2.49				
Lymphatic system, others.....	79	1.10	2	.03			4	.94					1	.21				
Total diseases of the lymphatic system.....	506	7.06	2	.03			75	17.55	2	.47			13	2.69				
Rheumatism, muscular.....	2,488	34.71	10	.14			198	46.84					94	19.48				
Osteitis and periostitis.....	110	1.53	8	.11			6	1.40	1	.23			1	.21				
Arthritis and synovitis.....	792	11.08	35	.49			60	14.04	4	.94			31	6.42				
Rheumatism, chronic articular.....	387	5.40	26	.36			67	15.68	2	.47			2	.41				
Muscles, bones, and joints, others.....	283	3.95	43	.60			21	4.91					2	.41				
Total diseases of the muscles, bones, and joints.....	4,060	56.64	122	1.70			352	82.38	7	1.64			130	26.94				
Total diseases of the integumentary system.....	9,444	131.75	7	.10			572	133.86					680	140.92				
Total diseases of the eye.....	1,195	16.67	70	.98	1	.01	87	20.86	7	1.64			67	13.86				
Total diseases of the ear.....	1,947	13.21	82	1.14			39	9.13	3	.70			13	2.69				
Total diseases of the nose.....	100	1.40	5	.07			2	.47					4	.88				
Total unclassified and undiagnosed.....	97	1.35	1	.01			4	.94					3	.62				
Total for diseases.....	107,174	1,485.19	1,432	20.63	836	11.66	7,279	1,703.49	107	25.04	87	20.36	7,368	1,630.34	9	1.86	109	22.59
Drowning.....	1	.01									8	.70						
Exhaustion from exposure and fatigue.....	110	1.53			46	.64	1	.23										
Heat stroke.....	76	1.06			1	.01	2	.47					7	1.45				
Lightning stroke.....	2	.03																
Venomous bites, stings, and wounds.....	500	6.98	1	.01			18	4.21					17	3.52				
Abrasions, blisters, burns, and scalds.....	1,569	21.89	1		2	.03	82	19.19					58	12.02				
Compression and concussion of brain.....	47	.66			4	.06	2	.47					1	.21				
Contusions and sprains.....	7,052	98.38	11	.15			414	96.89					109	22.59				
Dislocations.....	230	3.21	15	.21	3	.04	12	2.81	2	.47			2	.41				
Fractures (not shot).....	698	9.74	51	.71	22	.81	20	4.68	2	.47			13	8.73				
Hernia.....	332	4.63	57	.80			22	5.15	1	.23			7	1.45				
Wounds, contused, lacerated, and punctured.....	2,024	28.24	5	.07	3	.04	109	25.51					58	12.02				
Wounds, gunshot.....	1,067	14.89	14	.20	9	.13	72	16.85					7	1.45				
Wounds, incised.....	289	4.03	69	.96	86	1.20	21	4.91	2	.47			8	1.64				
Secondary results of injury.....	364	5.08	38	.53			11	2.67	2	.47			1	.21				
Other injuries.....	773	10.78	14	.20	20	.28	44	10.30					15	3.11				
Total for injuries.....	15,134	211.14	275	3.83	196	2.74	880	194.25	7	1.64	16	3.75	371	76.87	4	.83	7	1.45
Total for diseases and injuries.....	122,308	1,706.33	1,757	24.51	1,032	14.40	8,109	1,897.74	114	26.68	103	24.11	8,239	1,707.21	13	2.69	116	24.04

TABLE IV.—Admissions to sick report, discharges, and deaths in the Army, with ratios per 1,000 of mean strength, for the year 1902, at home and on insular service.

Causes of admission to sick report.	United States (continental).				Pacific Islands.				Cuba and Porto Rico.			
	89,798.		37,768.		3,274.							
	Admissions.	Discharges.	Deaths.	Ratio.	Admissions.	Discharges.	Deaths.	Ratio.	Admissions.	Discharges.	Deaths.	Ratio.
Mean strength.....	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Causes of admission to sick report.												
Scarlet fever.....	17	0.43	1	0.03	1	0.03						
Measles.....	834	20.99	24	0.61	328	8.68	4	0.11	2	0.61		
Smallpox.....	39	9.98	2	0.05	63	1.67	12	.32	3	9.98		
Vaccinia.....	1,688	42.48			250	6.62			65	23.52		
Influenza.....	863	21.72			108	2.86			77	31		
Dengue.....	18	4.5			6,473	171.39			1	4.89		
Mumps.....	686	17.38			574	15.20			16	6.1		
Diphtheria.....	15	3.8			4	1.1	1	.03	2	6.1		
Typhoid fever.....	341	8.68	34	.86	210	5.56	33	.87	14	4.23	2	0.61
Cholera, Asiatica.....					485	12.84	286	7.57				
Beri-beri.....	3	.08			623	16.60	4	0.11				
Cerebro-spinal fever.....	4	.10	1	.03	2	.05						
Malarial fever, intermittent.....	3,194	80.38			14,990	386.31	6	.16	286	87.86		
Malarial fever, remittent.....	301	12.61	1	.03	2,522	66.78	18	.48	75	22.91	2	.61
Malarial fever, pernicious.....	4	.10	1	.03	32	.85			2	6.1		
Malarial cachexia.....	127	2.20	2	.05	320	8.47	6	.16	3	9.2		
Fever, undetermined.....	304	7.65			764	20.23			39	11.91		
Erysipelas.....	47	1.18			13	.34	1	.03				
Septicemia and tetanus.....	6	.15	1	.03	7	.19	7	.19			1	.31
Rheumatic fever.....	241	6.06	3	.08	172	4.65	4	.11	9	2.75		
Consumption.....	153	3.85	111	2.79	192	5.08	78	2.07	9	2.75	7	2.14
Cancer.....	11	.28	2	.05			48	1.27			1	.31
Syphilis and results.....	915	23.03	174	4.38	769	20.85	30	.79	123	37.67	17	5.19
Gonorrhea and results.....	4,513	108.54	73	1.84	3,671	102.60	9	.24	425	129.81	2	.61
Chancroid and results.....	1,173	29.57	4	.10	1,269	33.34			150	45.82		
Infectious, others.....	23	.73	7	.18	14	.37	3	.08	1	.31		
Total infectious diseases.....	15,528	390.78	379	9.54	92	2.32	131	3.47	1,302	397.68	26	7.94
Anemia.....	52	1.31	3	.08	33,990	899.97	464	12.29	6	1.83		
Nutrition, others.....	81	.78	83	.96	122	3.23	3	.08	1	.31		
Total diseases of nutrition.....	88	2.09	41	1.03	174	4.61	7	.19	7	2.14	1	.31

Alcoholism	971	24.44	2	05	11	28	701	18.56	2	05	13	94	168	48.26	3	92	
Brain and spinal cord	143	3.60	57	1.43	6	13	98	2.99	21	56	7	19	15	4.58	7	1.14	1
Insanity	50	1.26	66	1.66	1	08	86	2.25	81	2.14	2	06	8	4.92	4	1.22	
Meningitis	4	10					4										
Poisoning, narcotic	35	5	13	9	23	24		.64	5	13	2	06	4	1.22			
Nervous system, others	770	19.88	36	.91	1	.08	781	20.68	14	.37			70	21.38	3	.92	
Total diseases of the nervous system	1,973	49.65	166	4.18	31	.78	1,698	44.83	123	3.26	26	.69	280	76.36	17	5.19	2
Poisoning, irritant		75			6	15	198	5.19					10	8.05			
Tonsillitis	3,683	91.48			1	.08	781	20.68			2	.06	89	27.19			
Peritonsillitis, pharyngitis, and sore throat	9	28	2	.06	5	.13	14				.7	.19	27	69.31	1	.31	
Dyspepsia, colic, and constipation	2,584	64.53	8	.08	2	.05	816	83.85	8	.06	3	.08	13	13.13			
Gastritis	577	14.62	1	.08	2	.05	2,928	44.85	6	.16	84	2.22	16	4.89			
Dysentery, acute	202	5.06	1	.08	10	.25	1,442	38.19	33	.87	72	2.01	5	1.53	1	.31	
Dysentery, chronic	417	10.49	63	1.59	25	.13	309	77.63	8	.13	13	.34	184	66.20			
Dysentery, diseases, others	8,560	90.84	9	.23	2	.05	893	352.89	5	.08	12	.32	11	1.22			
Diarrhœal diseases, others	216	5.44	2	.05	2	.05	883	28.64	3	.08	5	.13	11	3.86	1	.31	
Enteritis	133	3.85	11	.28	5	.13	124	3.28	4	.11	21	.66	123	37.57			
Perityphlitis and appendicitis	1,370	34.43	11	.28	4	.10	1,481	39.22									
Digestive system, others																	
Total diseases of the digestive system	12,741	320.64	107	2.69	37	.93	25,010	688.68	56	1.48	219	5.80	714	218.08	2	.61	1
Heart, diseases of	260	6.54	104	2.62	15	.38	240	6.85	27	.71	31	.82	11	3.86	4	1.22	
Arteries and veins	79	1.99	8	.20	3	.08	43	1.14	2	.06	2	.06	8	2.44	1	.31	
Total diseases of the circulatory system	839	8.53	112	2.82	18	.45	283	7.49	29	.77	33	.87	19	5.80	5	1.53	
Bronchitis	3,068	77.71	9	.23	1	.03	1,581	41.86					147	44.90			
Pneumonia	1,170	4.28	1	.03	23	.58	1,102	2.70			1	.08	4	1.22			
Pleurisy	4,040	4.78	9	.23	4	.10	126	3.34	3	.06	1	.08	7	2.14			
Respiratory system, others	1,060	26.43	14	.35	2	.05	711	18.83	1	.03			36	11.00	1	.31	
Total diseases of the respiratory system	4,498	113.20	33	.83	30	.75	2,520	66.73	4	.11	25	.66	194	59.25	1	.31	2
Kidneys, diseases of	108	2.72	19	.48	14	.35	136	8.60	6	.13	22	.58	2	.61	1	.31	
Varicoele	188	4.73	6	.15			100	2.65	2	.05			14	4.28			
Genito-urinary, others	515	12.96	12	.30	1	.03	478	12.66	5	.13	1	.03	72	21.99			

TABLE IV.—Admissions to sick report, discharges, and deaths in the Army, with ratios per 1,000 of mean strength, for the year 1902, at home and on insular service—Continued.

	United States (continental).				Pacific Islands.				Cuba and Porto Rico.			
	39,736.				37,768.				8,274.			
	Admissions.	Discharges.	Deaths.	Ratio.	Admissions.	Discharges.	Deaths.	Ratio.	Admissions.	Discharges.	Deaths.	Ratio.
Mean strength.....	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Causes of admission to sick report.												
Rheumatism, chronic articular.....	268	6.74	20	0.50	166	4.40	8	0.21	22	6.72		
Muscles, bones, and joints, others.....	168	4.23	38	.96	121	3.20	5	.13	17	5.19		
Total diseases of the muscles, bones, and joints.....	2,450	61.66	102	2.57	1,920	50.84	25	.66	172	52.54	2	0.61
Total diseases of the integumentary system.....	3,851	96.92	3	.08	6,304	166.92	2	.05	541	165.24	2	.61
Total diseases of the eye.....	621	15.63	45	1.13	687	18.19	32	.85	41	12.52		
Total diseases of the ear.....	401	10.09	43	1.21	564	14.93	36	.96	84	10.88	1	.31
Total diseases of the nose.....	66	1.66	2	.05	39	1.03	8	.08	1	.31		
Total unclassified and undiagnosed.....	59	1.48	1	.03	35	.93			10	8.05		
Total for diseases.....	43,677	1,099.18	1,079	27.15	75,228	1,931.84	461	12.21	3,416	1,043.87	58	17.72
Drowning.....												
Exhaustion from exposure and fatigue.....	43	1.08	16	.40			32	.85	1	.31	1	.31
Heat stroke.....	13	.33			61	1.62	1	.03	8	2.44		
Lightning stroke.....	1	.03			71	1.83			1	.31		
Venomous bites, stings, and wounds.....	208	5.23	1	.03	274	7.25			63	16.19		
Abrasions, blisters, burns, and scalds.....	712	17.92	1	.03	966	23.99			91	27.79	1	.31
Contusions and concussion of brain.....	29	.73	3	.08	19	.50	1	.03	2	.61		
Contusions and sprains.....	6,110	156.60	10	.25	2,102	55.56	1	.03	863	110.87		
Dislocations.....	144	3.62	11	.28	90	2.38	2	.06	10	3.05		
Fractures (not shot).....	469	11.80	43	1.08	242	6.41	8	.21	25	7.64	2	.61
Hernie.....	217	5.46	6	.15	183	3.52	13	.34	11	3.86		
Wounds, contused, lacerated, and punctured.....	1,889	48.70	1	.03	711	18.83			141	43.07		
Wounds, incised.....	571	14.37	6	.15	651	14.56	2	.05	75	22.91	1	.31
Wounds, gunshot.....	124	3.12	34	.86	192	5.06	9	.24	13	3.97	6	1.88
Secondary results of injury.....	217	5.46	29	.73	143	3.79	1	.03	16	4.89	2	.61
Other injuries.....	522	13.14	13	.33	279	7.39	7	.19	31	9.47		
Total for injuries.....	9,719	244.60	196	4.98	6,775	152.91	80	2.12	841	256.87	8	2.44
Total for diseases and injuries.....	53,896	1,343.77	1,277	32.14	81,003	2,144.75	541	14.33	4,257	1,300.24	66	20.16
			311	7.83			918	24.31			22	6.72

TABLE V (a).—Admissions to sick report, discharges, and deaths in the Army, with ratios per 1,000 of mean strength, for the year 1902, by arms of service.

	Infantry.						Cavalry.						Artillery.					
	33,337.						14,676.						17,058.					
	Admissions.	Discharges.	Deaths.	Ratio.	Number.	Ratio.	Admissions.	Discharges.	Deaths.	Ratio.	Number.	Ratio.	Admissions.	Discharges.	Deaths.	Ratio.	Number.	Ratio.
Causes of admission to sick report.																		
Scarlet fever.....	4	0.12	2	0.06	1	0.07	78	5.31	2	0.14	5	0.29	310	18.17	5	0.29		
Measles.....	309	9.27	7	.21	9	.61	223	15.20			10	.59	854	50.06				
Smallpox.....	40	1.20			186	12.67	1,634	111.34			212	12.43	212	12.43				
Vaccinia.....	387	11.61			1,115	7.84	3	.20			4	.23	294	17.23				
Influenza.....	299	8.97			3	.08	118	8.04			18	.89	160	9.38				
Dengue.....	3,374	101.21			196	4.08	122	8.31			72	4.91	5	.29				
Mumps.....	452	13.56			2	.06	4	.27			1	.07						
Diphtheria.....	7	.21			1	.03	2	.06			1	.07						
Typhoid fever.....	198	5.94			26	.78	118	8.04			18	.89	160	9.38				
Cholera, Asiatica.....	231	6.93			196	4.08	122	8.31			72	4.91	5	.29				
Beri-beri.....	23	.69			2	.06	4	.27			1	.07						
Cerebro-spinal fever.....	2	.05			2	.06	3,154	214.91			1	.06						
Malarial fever, intermittent.....	9,912	297.33			5	.15	733	49.94			1	.07	1,803	76.39				
Malarial fever, remittent.....	1,564	46.92			6	.18	2	.14			2	.14	209	12.25				
Malarial fever, pernicious.....	18	.54			7	.21	18	1.21			3	.18	3	.18				
Malarial cachexia.....	250	7.50			8	.09	73	4.97			61	3.58	61	3.58				
Fever, undetermined.....	514	15.42			188	12.81	9	.61			22	1.23	163	9.56				
Erysipelas.....	22	.66			3	.09	9	.61			8	.20	22	1.23				
Septicemia and tetanus.....	6	.18			4	.12	82	5.59			1	.06	83	4.87				
Rheumatic fever.....	191	5.73			92	2.76	49	3.34			31	2.11	56	3.28				
Consumption.....	169	5.07			2	.06	1	.07			7	.48	3	.18				
Cancer.....	6	.18			2	.06	841	50.06			1	.06	6	.18				
Syphilis and results.....	970	29.10			86	2.53	1	.03			49	3.34	337	19.76				
Gonorrhea and results.....	4,000	119.99			26	.78	1,869	133.48			17	1.16	1,732	105.05				
Chancroid and results.....	1,525	39.76			2	.06	643	43.81			3	.20	418	24.60				
Infectious, others.....	10	.30			2	.06	9	.61			8	.20	9	.61				
Total infectious diseases.....	24,282	723.38			220	6.50	9,742	683.80			104	7.09	6,678	391.49				
Anemia.....	84	2.52			2	.06	45	3.07			8	.20	27	1.58				
Nutrition, others.....	49	1.47			10	.30	16	1.09			1	.07	13	.76				
Total diseases of nutrition.....	133	3.99			12	.36	61	4.16			4	.27	40	2.34				

Kidneys, diseases of	110	3.30	2	4	12	22	.66	42	2.86	9	.61	4	.27	54	3.17	10	.59	2	.21
Varicocele	102	3.06	4	2	.06	...	...	69	4.70	2	.14	...	...	88	4.87	4	.36	1	.06
Genito-urinary, others	490	14.70	3	3	.09	1	.03	200	13.63	2	.14	...	...	225	13.19	6	...	...	...
Total diseases of the genito-urinary system	702	21.06	9	9	.27	23	.69	311	21.19	13	.89	4	.27	362	21.22	20	1.17	3	.18
Adenitis	224	6.72	...	...	...	...	...	114	7.77	2	.14	...	...	123	7.21	...	...	...	...
Lymphatic system, others	31	.93	1	1	.03	...	...	23	1.70	...	...	...	...	19	1.11	1	.06	...	...
Total diseases of the lymphatic system	255	7.65	1	1	.03	...	...	139	9.47	2	.14	...	...	142	8.82	1	.06	...	...
Rheumatism, muscular	1,956	37.68	3	3	.09	...	...	502	34.20	2	.14	...	...	645	37.81	4	.23	...	...
Ossicles and periostitis	45	1.65	3	3	.09	...	...	18	1.23	1	.07	...	...	28	1.64	4	.23	...	...
Gonorrhea and syphilis	414	12.42	13	13	.36	...	...	153	10.43	12	.82	...	...	208	12.08	11	.64	...	...
Rheumatism, chronic articular	312	4.36	13	13	.36	...	...	98	6.47	4	.27	...	...	92	5.39	17	.91	...	...
Muscles, bones, and joints, others	128	8.84	13	13	.39	...	...	81	5.52	7	.48	...	...	70	4.10	17	1.00	...	...
Total diseases of the muscles, bones, and joints	2,065	61.94	46	46	1.38	...	...	849	57.85	26	1.77	...	...	1,041	61.03	43	2.62	...	...
Total diseases of the integumentary system	5,298	158.98	33	33	.99	...	...	2,359	160.71	14	.95	...	...	1,824	106.98	3	.18	...	...
Total diseases of the eye	489	17.67	38	38	.99	...	...	233	17.24	14	.95	...	...	283	16.88	11	.64	1	.06
Total diseases of the ear	479	14.37	40	40	1.20	...	...	186	12.67	16	1.09	...	...	210	12.81	17	1.00	...	...
Total diseases of the nose	33	1.14	4	4	.12	...	...	19	1.29	1	.07	...	...	26	1.52	...	...	...	...
Total unclassified and undiagnosed	49	1.47	...	...	...	...	...	16	1.09	...	...	...	...	25	1.47	1	.06	...	...
Total for diseases	59,733	1,791.79	624	624	18.72	517	15.51	23,886	1,624.15	335	22.83	180	12.26	20,210	1,184.78	388	23.04	89	5.22
Drowning	50	1.50	...	...	...	22	.66	1	.07	...	...	15	1.02	...	1.29	...	...	6	.35
Exhaustion from exposure and fatigue	55	1.65	...	...	...	...	...	24	1.64	...	...	...	...	11	.64	...	...	...	...
Heat stroke	55	1.65	...	...	...	...	...	9	.61	...	...	...	...	...	...	...	...	...	...
Lacerations	1	.03	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Venous thrombosis	243	7.29	...	...	...	...	...	129	8.79	...	...	...	...	113	6.62	...	...	...	...
Venomous bites, stings, and wounds	884	26.52	...	...	...	...	...	327	22.28	...	...	...	...	355	20.81	...	...	2	.12
Abrasions, blisters, burns, and scalds	14	.42	...	...	...	...	...	22	1.50	...	...	2	.14	...	10	.59	...	1	.06
Compression and concussion of brain	2,264	67.91	3	3	.09	1	.03	2,430	165.58	8	.55	...	...	2,312	135.55	...	...	...	...
Contusions and sprains	96	2.88	...	...	...	...	...	65	4.43	6	.41	...	...	66	3.87	4	.23	1	.06
Dislocations	259	7.77	...	...	...	...	...	187	12.74	17	1.16	4	.27	203	11.90	15	.88	8	.47
Fractures (not shot)	146	4.38	...	...	...	...	...	71	4.84	8	.55	...	...	84	4.92	12	.70	...	...
Hemiplegia	314	9.34	...	...	...	...	...	548	37.34	1	.07	...	...	654	38.34	2	.12	1	.06
Wounds, contused, lacerated, and punctured	536	16.08	10	10	.30	3	.09	244	16.63	...	...	8	.55	295	17.29	3	.18	1	.06
Wounds, incised	155	4.63	...	...	...	...	...	88	6.00	13	.89	...	...	95	4.81	10	.59	11	.64
Wounds, gunshot	151	4.53	...	...	...	...	...	116	7.90	8	.55	...	...	76	4.45	12	.70	...	...
Secondary results of injury	291	8.73	...	...	...	...	...	222	15.13	2	.14	1	.07	236	13.83	5	.29	3	.18
Other injuries	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total for injuries	5,959	178.75	116	116	3.48	112	3.36	4,483	305.46	63	4.29	44	3.00	4,485	262.92	63	3.69	34	1.99
Total for diseases and injuries	65,692	1,970.54	740	740	22.20	629	18.87	23,319	1,929.61	398	27.12	224	15.27	24,695	1,447.71	456	26.73	123	7.21

TABLE V (b).—Admissions to sick report, discharges, and deaths in the Army, with ratios per 1,000 of mean strength, for the year 1902, by arms of service—Continued.

Cause of admission to sick report.	Engineers.						Ordnance.						Signal Corps.					
	1,175.						719.						761.					
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Measles.....	14	11.91											8	10.51			1	1.31
Smallpox.....	1	.85											1	1.31				
Vaccinia.....	8	6.81					10	13.91					13	17.08				
Influenza.....	14	11.91					18	25.04					9	11.83				
Dengue.....	43	40.85					10	13.91					51	67.02				
Mumps.....	6	5.11					1	1.39					1	1.31				
Diphtheria.....	1	.85					1	1.39										
Typhoid fever.....	80	25.53			6	6.11							3	3.94			2	2.63
Cholera Asiatica.....	6	5.11			2	1.70							5	6.57			3	3.94
Malarial fever, intermittent.....	290	246.81					26	36.16					87	114.82				
Malarial fever, remittent.....	56	47.66			1	.85							24	31.54				
Malarial cachexia.....	6	4.26			1	.85							5	6.57				
Fever, undetermined.....	20	17.02											5	6.57				
Erysipelas.....	2	1.70					1	1.39										
Rheumatic fever.....	10	8.51		0.85			3	4.17					8	10.51				
Consumption.....	9	7.66		5.96	1	.85	1	1.39	1	1.39			4	5.26	3	3.94		
Syphilis and results.....	30	25.53		4.30			3	4.17					11	14.46				
Gonorrhea and results.....	152	129.36		1.85			3	4.17					51	67.02	2	2.63		
Chancroid and results.....	44	37.45					1	1.39					18	23.65				
Total infectious diseases.....	746	634.90	13	11.06	11	9.36	78	108.48	1	1.39			304	399.47	5	6.57	6	7.86
Anemia.....	2	1.70											3	3.94				
Total diseases of nutrition.....	2	1.70											3	3.94				
Alcoholism.....	22	18.72																
Brain and spinal cord.....	1	.85					22	30.60					15	19.71				
Insanity.....	1	.85					3	4.17					2	2.63	1	1.31		
Poisoning, narcotic.....	2	1.70	5	4.26			1	1.39	1	1.39			1	1.31				
Nervous system, others.....	33	28.08			1	.85												
Total diseases of the nervous system.....	59	50.21	5	4.26	1	.85	19	26.43					10	13.14				
							45	62.59	1	1.39			27	35.48	2	2.63		

Poisoning, irritant.....	1	85							2	2 78							1	1 31		
Tonsillitis, pharyngitis, and sore throat.....	75	68 82							30	41 73							25	82 85		
Dyspepsia, colic, and constipation.....	158	134 47							36	50 07							25	82 85		
Gastritis.....	26	22 13	1	.85					14	19 47							16	21 08		
Dysentery, acute.....	87	74 04							8	4 17							34	44 68		
Dysentery, chronic.....	57	48 51	1	.85					4	5 56							36	47 31	1	1 31
Diarrheal diseases, others.....	315	288 10							45	62 59							88	115 64		
Dysentery, chronic.....	14	11 91							8	4 17							19	24 97		
Enteritis.....	6	5 11	1	.85					1	1 39							2	2 63		
Perityphlitis and appendicitis.....	54	45 96							21	28 21							16	21 08		
Digestive system, others.....																				
Total diseases of the digestive system.....	793	674 89	3	2 55	4	3 40			159	221 14							263	345 60	1	1 31
Heart, diseases of.....	10	8 51	3	2 55	1	.85			3	4 17							1	1 31		
Arteries and veins.....	6	5 11	1	.85					1	1 39							1	1 31		
Total diseases of the circulatory system.....	16	13 62	4	3 40	1	.85			4	5 56							2	2 63		
Bronchitis.....	74	62 98							51	70 92							12	15 77		
Pneumonia.....	9	7 66							1	1 39							1	1 31		
Pleurisy.....	3	2 56																		
Respiratory system, others.....	25	21 28							30	41 73							6	6 57		
Total diseases of the respiratory system.....	111	94 47							82	114 06							18	23 65		
Kidneys, diseases of.....	7	5 96	1	.85	1	.85			1	1 39							1	1 31		
Varicocele.....	12	10 21															1	1 31		
Genito-urinary, others.....	12	10 21							6	8 84	1	1 39					9	11 83		
Total diseases of the genito-urinary system.....	31	26 38	1	.85	1	.85			7	9 74	1	1 39					11	14 46		
Adenitis.....	8	6 81							1	1 39							1	1 31		
Lymphatic system, others.....	4	3 40																		
Total diseases of the lymphatic system.....	12	10 21							1	1 39							1	1 31		
Rheumatism, muscular.....	80	68 09							57	79 28	1	1 39					5	6 57		
Osteitis and peritonitis.....																				
Arthritis and synovitis.....	12	10 21	1	.85					3	4 17							1	1 31		
Rheumatism, chronic articular.....	22	18 72							3	4 17							1	1 31		
Muscles, bones, and joints, others.....	7	5 96	1	.85					1	1 39							1	1 31		
Total diseases of the muscles, bones, and joints.....	121	102 98	2	1 70					64	89 02	1	1 39					10	13 14		
Total diseases of the integumentary system.....	114	97 02							28	38 94							40	52 57		
Total diseases of the eye.....	29	24 68	2	1 70					4	5 56							11	14 46	1	1 31
Total diseases of the ear.....	16	18 62	2	1 70					5	6 86							3	3 94		

TABLE V (b).—Admissions to sick report, discharges, and deaths in the Army, with ratios per 1,000 of mean strength, for the year 1902 by arms of service—Continued.

	Engineers.						Ordnance.						Signal Corps.					
	1,175.						719.						761.					
	Admissions.	Discharges.	Deaths.	Ratio.	Number.	Ratio.	Admissions.	Discharges.	Deaths.	Ratio.	Number.	Ratio.	Admissions.	Discharges.	Deaths.	Ratio.	Number.	Ratio.
Cause of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the nose.....	3	2.55			1	1.39							1	1.31				
Total unclassified and undiagnosed.....	1	.85											2	2.63				
Total for diseases.....	2,054	1,748.09	82	27.24	19	16.17	478	664.81	5	6.95	5	6.95	696	914.59	9	11.83	6	7.88
Drowning.....					1	.85												
Exhaustion from exposure and fatigue.....	2	1.70											1	1.31				
Heat stroke.....	2	1.70																
Venomous bites, stings, and wounds.....	2	1.70			2	2.78							3	3.94				
Abrasions, blisters, burns, and scalds.....	36	80.64											5	6.57				
Contusions and sprains.....	145	123.41			43	59.80							18	23.65			1	1.31
Dislocations.....	6	5.11			2	2.78							1	1.31				
Fractures (not shot).....	8	6.81			5	6.95							1	1.31				
Hernie.....	4	3.40			3	4.17							2	2.63				
Wounds, contused, lacerated, and punctured.....	44	37.45			12	16.69							6	7.88				
Wounds, incised.....	31	26.38			6	8.84							3	3.94				
Wounds, gunshot.....	6	4.26											1	1.31			1	1.31
Secondary results of injury.....	3	2.55			1	.85							8	10.51				
Other injuries.....	13	11.06			13	18.06												
Total for injuries.....	301	256.17	4	3.40	2	1.70	86	119.61					1	1.39	49	64.39	2	2.63
Total for diseases and injuries.....	2,355	2,004.26	36	30.64	21	17.87	564	784.42	5	6.95	6	8.94	745	978.98	9	11.83	8	10.51

TABLE V (c).—Admissions to sick report, discharges, and deaths in the Army, with ratios per 1,000 of mean strength, for the year 1902, by arms of service—Continued.

	Medical Corps. ^a						Philippine Scouts. ^b						Others.					
Mean strength.....	4,298.			4,925.			3,834.											
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.	Admissions.	Discharges.	Deaths.						
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.						
Scarlet fever.....	23	5.36					35	7.11		8	2.09	1	0.26					
Measles.....	6	1.40					20	4.06		387	100.94	21	5.48					
Smallpox.....	32	7.45	1	0.23			12	2.44	1	0.20	18	4.70	2	.52				
Vaccinia.....	48	11.18					15	3.06			464	121.02						
Influenza.....	420	97.84					722	146.60			98	25.56						
Dengue.....	21	4.89					191	38.78			21	5.48						
Mumps.....											196	50.86						
Diphtheria.....	25	5.82	2	.47			9	1.83		1	.20	5	1.30					
Typhoid fever.....	32	7.45	17	3.96			83	16.85		51	10.86	4	1.04					
Cholera Asiatica.....	1	.23	1	.23			598	121.42	2	0.41	1	.26	1	.26				
Beri-beri.....																		
Cerebro-spinal fever.....	353	82.23						615.63			26		1	.26				
Malaria fever, intermittent.....	120	27.96					363	78.71			263	65.99						
Malaria fever, remittent.....	2	.47	2	.47			13	2.64	8	1.62	29	7.56						
Malaria fever, pernicious.....	24	5.59					18	3.65			14	3.65						
Malaria cachexia.....	39	9.08					170	34.52			8	2.09						
Fever, undetermined.....	3	.70					1	.20	1	.20								
Erysipelas.....	1	.23	1	.23			1	.20			1	.26						
Septicemia and tetanus.....	16	3.73	1	.23			17	3.46			12	3.13	1	.26				
Rheumatic fever.....	21	4.89	11	2.56	2	.47	24	4.87	3	.61	21	5.48	14	3.65				
Consumption.....	1	.23									2	.52	1	.26				
Cancer.....	44	10.25	7	1.63			29	4.06			51	13.30	7	1.83				
Syphilis and results.....	220	51.25	2	.47			182	36.96			250	65.21	7	1.83				
Gonorrhea and results.....	38	8.85	1	.23			34	6.90			63	16.43						
Chancroid and results.....	4	.93					2	.41			10	2.61	2	.52				
Infectious, others.....																		
Total infectious diseases.....	1,494	348.03	21	4.89	26	6.06	5,562	1,129.34	5	1.02	97	19.69	1,984	504.43	31	8.09	34	8.87
Anemia.....	4	.93																
Nutrition, others.....	2	.47	2	.47	1	.23	7	1.42					8	2.09	1	.26		
Total diseases of nutrition.....	6	1.40	2	.47	1	.23	7	1.42					4	1.04	23	6.00		
													12	3.13	24	6.26		

^a Includes 177 volunteer medical officers.^b Including white officers.

TABLE V (c).—Admissions to sick report, discharges, and deaths in the Army, with ratios per 1,000 of mean strength, for the year 1902, by arms of service—Continued.

	Medical Corps.						Philippine Scouts.						Others.					
	4,293.						4,925.						3,884.					
	Admissions.	Discharges.	Deaths.	Number.	Ratio.	Number.	Admissions.	Discharges.	Deaths.	Number.	Ratio.	Number.	Admissions.	Discharges.	Deaths.	Number.	Ratio.	Number.
Causes of admission to sick report.																		
Alcoholism.....	72	16.77	1	0.23	1	0.23	6	1.22					41	10.69				
Brain and spinal cord.....	17	3.96	2	.47	2	.47	2	.41	1	0.20			19	4.96	2	0.52		
Insanity.....	9	2.10	6	1.40			4	.81	2	.41			5	1.30	4	1.04		
Meningitis.....							2	.41										
Poisoning, narcotic.....	12	2.80	1	.23	2	.47	1	.20					2	.52				
Nervous system, others.....	87	20.27	1	.23			61	12.39					89	23.21	2	.52		
Total diseases of the nervous system.....	197	45.89	11	2.56	5	1.16	76	15.43	3	.61	2	.41	155	40.69	14	3.65	2	.52
Poisoning, irritant.....	7	1.63																
Tonsillitis, pharyngitis, and sore throat.....	172	40.07			1	.23	25	6.08					250	65.20				
Peritonitis.....	4	.93			2	.47	1	.20					1	.26			1	.26
Dyspepsia, colic, and constipation.....	168	39.14					215	43.66					145	37.82				
Gastritis.....	127	29.56					80	16.24					40	10.43	1	.26		
Dysentery, acute.....	182	42.99	1	.23	7	1.63	113	22.96					25	6.52				
Dysentery, chronic.....	138	32.15	4	.93	2	.47	10	2.03	2	.41			33	8.61	6	1.80	4	1.04
Diarrheal diseases, others.....	308	70.66					478	97.06					124	32.84				
Enteritis.....	70	16.81			1	.23	29	6.89					26	6.76				
Perityphilitis and appendicitis.....	34	7.92			1	.23	3	.61					5	1.30				
Digestive system, others.....	89	20.73	1	.23			83	16.85					80	20.87	1	.26		
Total diseases of the digestive system.....	1,294	301.42	6	1.40	14	3.26	1,038	210.76					731	190.66	7	1.83	5	1.30
Heart, diseases of.....	25	5.82	3	.70	2	.47	10	2.03					39	10.17	28	7.30	1	.26
Arteries and veins.....	6	1.16					2	.41					7	1.83				
Total diseases of the circulatory system.....	30	6.99	3	.70	2	.47	12	2.44					46	12.00	28	7.30	2	.52
Bronchitis.....	128	29.82																
Pneumonia.....	6	1.40			2	.47	201	40.82					169	44.08				
Pleurisy.....	25	5.82	1	.23	1	.23	8	1.62					17	4.43			4	1.04
Respiratory system, others.....	82	7.45					51	10.36					75	19.56	1	.26	1	.26
Total diseases of the respiratory system.....	191	44.49	1	.23	3	.70	281	57.06					285	74.34	1	.26	5	1.30

[illegible]

INTERNATIONAL TABLE I.—*Examination of recruits during the year 1902.*

No.		White.	Colored.	Total.
1	Total number recruits examined	42,188	3,085	45,218
2	Of each 1,000 of these:			
3	Were accepted for service	658.80	786.16	667.34
4	Were rejected for underheight .....	.95	.99	.95
5	Were rejected for disabilities	255.29	171.33	249.57
6	Of each 1,000 accepted recruits the heights were as follows (in inches):			
7	Under 61 .....	.82	.84	.36
8	61 to 62 .....	.40	.42	.40
9	62 to 63	1.51	2.93	1.62
10	63 to 64	11.51	10.06	11.40
11	64 to 65	87.69	99.33	88.62
12	65 to 66	125.73	137.89	126.69
13	66 to 67	162.72	171.42	163.41
14	67 to 68	177.08	189.86	178.09
15	68 to 69	158.98	147.11	158.04
16	69 to 70	123.14	117.77	122.71
17	70 to 71	76.11	70.41	75.66
18	71 to 72	40.05	31.85	39.40
19	72 to 73	22.81	14.25	21.67
20	73 to 74	8.89	8.35	8.45
21	74 upward	3.56	2.51	3.48
22	Causes of rejection (exclusive of underheight) expressed in ratios per 1,000 of examined recruits:			
23	Physical debility	1.23	.99	1.22
24	Tuberculosis of lungs or other organs	3.15	.66	2.99
25	Imperfect vision	33.81	18.12	32.28
26	Heart disease	21.34	11.53	20.68
27	Goiter .....	.40	.66	.42
28	Varicose veins, varicocele, hemorrhoids	37.03	11.20	35.29
29	Hernia	11.02	8.24	10.84
30	Flat feet	3.80	3.63	3.78

INTERNATIONAL TABLE III.—*Movements of sick by branches of military service and by months, 1902.*

	Absolute numbers.					Proportions per 1,000.			
	Mean strength.	Sick admissions.	Sick disposed of—			In 1,000 of mean strength there were—		In 1,000 of sick disposed of there were a—	
			Total. ^a	As fit for duty (recovered). ^a	By death.	Total sick admissions.	Deaths.	Fit for duty (recovered).	Deaths.
ARM OF SERVICE.									
Infantry.....	33,337	65,692	.....	.....	629	1,970.54	18.87	.....	.....
Cavalry.....	14,676	28,319	.....	.....	224	1,929.61	15.27	.....	.....
Artillery.....	17,058	24,695	.....	.....	123	1,447.71	7.21	.....	.....
Ordnance.....	719	564	.....	.....	6	784.42	8.34	.....	.....
Engineers.....	1,175	2,355	.....	.....	21	2,004.26	17.87	.....	.....
Signal Corps.....	761	745	.....	.....	8	978.98	10.51	.....	.....
Medical Department.....	4,293	3,938	.....	.....	67	917.31	15.61	.....	.....
Philippine scouts.....	4,925	3,308	.....	.....	119	1,686.90	24.16	.....	.....
All others.....	3,834	4,040	.....	.....	54	1,063.78	14.08	.....	.....
MONTH.									
January.....	88,576	12,569	.....	.....	84	141.90	.95	.....	.....
February.....	86,987	10,888	.....	.....	86	125.17	.99	.....	.....
March.....	84,686	11,341	.....	.....	102	133.92	1.20	.....	.....
April.....	82,794	12,079	.....	.....	88	145.89	1.06	.....	.....
May.....	81,744	12,780	.....	.....	104	156.32	1.27	.....	.....
June.....	80,580	12,826	.....	.....	149	159.17	1.85	.....	.....
July.....	79,908	13,362	.....	.....	153	167.22	1.91	.....	.....
August.....	79,764	12,470	.....	.....	137	156.32	1.72	.....	.....
September.....	79,191	10,884	.....	.....	98	137.44	1.24	.....	.....
October.....	78,919	10,314	.....	.....	95	130.69	1.20	.....	.....
November.....	73,994	10,172	.....	.....	90	137.47	1.22	.....	.....
December.....	72,202	8,971	.....	.....	65	124.25	.90	.....	.....

^a Information not tabulated.

INTERNATIONAL TABLE VI.—Admissions of important diseases by branches of military service, 1902.

No.	Diseases of the international nosological table.	Absolute number of admissions.								Admissions per 1,000 of mean strength.									
		Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	Philippine Scouts.	All others.	Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	Philippine Scouts.	All others.
1	Alcoholismus acutus, including delirium tremens.	865	216	571	22	22	15	72	6	41	25.95	14.72	33.47	30.60	18.72	19.71	16.77	1.22	10.69
2	Bronchitis, all.	1,714	817	1,650	51	74	12	128	201	169	51.42	55.67	96.73	70.92	62.96	16.77	29.82	40.82	44.08
3	Cholera Asiatica.	231	122	6	6	6	6	32	83	1	6.93	8.31	9.29		5.11	6.57	7.45	16.86	2.36
4	Cholera nostras.																		
5	Diphtheria.	3	3	4	1	1	1				21	20	23	1.89	.86	.86			1.80
6	Dysentery.	8,190	881	217	7	144	70	320	123	68	95.70	60.03	12.72	9.73	122.56	91.99	74.54	24.98	15.13
7	Erysipelas.	22	9	22	1	2		3			66	.61	1.29	1.89	1.70			.20	
8	Febris intermittens (malaria).	9,912	3,154	1,803	26	290	87	353	3,032	253	297.33	214.91	76.89	36.16	246.81	114.32	82.23	615.63	65.99
9	Febris recurrens.	1,814	806	1,270		61	29	144	381	43	64.42	64.91	18.53	4.17	51.92	38.11	33.54	77.36	11.21
10	Gonorrhea.	4,000	1,969	1,792	8	152	51	220	182	250	112.99	133.45	105.05	4.17	129.36	67.02	51.25	36.96	63.21
11	Hernia.	146	71	84	3	4	2	11	7	53	4.38	4.84	4.92	4.17	3.40	2.63	2.66	1.42	8.61
12	Influenza.	299	186	361	18	14	9	45	15	96	8.97	12.67	21.16	25.04	11.91	11.83	11.13	3.05	25.66
13	Insolatio (hitzschlag, coup de chaleur).	55	9	11		2			7	1	1.65	.61	.04		1.70			1.42	.26
14	Meningitis cerebro spinalis epidemica.	2	2								.06	.14	.06						
15	Morbilli.	309	73	310		14	8	23	35	387	9.27	5.31	18.17		11.91	10.51	5.36	7.11	100.94
16	Parotitis epidemica.	452	115	294	1	6	1	21	191	196	13.56	7.84	17.23	1.39	5.11	1.31	4.89	38.73	50.86
17	Pneumonia crouposa sive lobaris.	121	40	60	1	6	1	6	21	17	3.63	2.73	3.82	1.39	7.66	1.31	1.40	4.26	4.43
18	Rheumatismus articularum.	403	177	175	6	32	9	36	20	21	12.09	12.06	10.26	8.94	27.23	11.83	8.16	4.06	3.46
19	Scarlatina.	4	1	5						8	.12	.07	.29						2.09
20	Scorbutus.																		
21	Syphilis.	970	341	337	8	30	11	44	20	51	29.10	23.23	19.76	4.17	25.53	14.46	10.25	4.06	13.30
22	Trachoma.																		
23	Tuberculosis pulmonum.	169	49	56	1	9	4	21	24	21	5.07	3.34	3.26	1.39	7.66	5.26	4.89	4.87	5.48
24	Tuberculosis ceterorum organorum.																		
25	Typhus abdominalis.	198	118	160		30	3	25	9	22	5.94	8.04	9.38		25.53	3.94	5.82	1.83	5.74
26	Typhus exanthematicus.																		
27	Varicella.	40	9	10		1	1	6	20	18	1.20	.61	.59		.85	1.31	1.40	4.06	4.70
28	Morbi auri.	479	186	210	5	16	3	95	14	50	14.37	12.67	12.31	6.95	13.62	3.94	8.39	2.84	13.04
29	Morbi cordis.	221	111	91	8	10	1	25	10	89	6.63	7.56	5.33	4.17	18.62	1.81	5.82	2.03	10.17
30	Morbi cutis.	5,296	2,359	1,824	28	114	40	169	683	181	158.95	160.71	106.68	38.94	97.02	52.57	89.37	188.68	47.21
31	Morbi oculi.	79	21	17	1	2		9	4	5	2.87	1.43	1.00	1.39	1.70	2.10	2.10	.81	1.30
32	Morbi mentis.	589	253	288	4	29	11	58	69	48	17.67	17.24	16.88	5.56	24.68	14.46	13.51	14.01	12.52
33	Morbi systemat. urin. et sexual (excl. ven. et syphilis).	702	311	362	7	81	11	73	89	77	21.06	21.19	21.22	9.74	26.38	14.46	17.00	7.92	20.08

a Acute not tabulated separately.

b Not tabulated separately.

c Including malarial cachexia.

REPORT OF THE SURGEON-GENERAL.

No.	Diseases of the International nosological table.	Admissions by months.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	Alcoholismus acutus, including delirium tremens.	153	144	151	166	157	148	141	142	156	159	159	154
2	Bronchitis acuta.	509	575	475	456	578	270	295	278	386	371	408	450
3	Cholera, Asiatica.				42	36	103	103	75	40	19	183	16
4	Cholera, nostras.												
5	Diphtheria.	3		2		5				3			1
6	Dysentery.	471	387	367	407	505	470	570	545	412	393	309	239
7	Erysipelas.		8	15	5	8	1	2		2	4	2	5
8	Febris intermittens (malaria).	1,947	1,475	1,611	1,985	2,060	1,762	1,570	1,943	1,305	1,195	1,153	1,041
9	Febris recurrens.	342	272	200	309	336	1,826	885	212	277	212	283	285
10	Gonorrhea.	771	687	708	680	731	716	730	831	722	672	784	638
11	Hernia.	33	28	24	28	32	28	29	41	32	24	34	21
12	Influenza.	173	144	147	145	80	60	47	16	65	22	30	80
13	Insolatio (hæmorrhag. coup de chaleur).	6	3	10	12	5	8	13	14	1		2	5
14	Meningitis cerebro spinalis epidemica.			2									
15	Morbilli.	168	276	265	205	131	69	18	12	3	3	1	12
16	Parotitis epidemica.	98	123	234	244	225	105	78	34	23	7	21	34
17	Pneumonia crouposa sive lobaris.	27	84	37	31	22	12	12	21	19	21	14	21
18	Rheumatismus articuli.	86	75	88	76	83	73	71	68	74	74	59	45
19	Scarlatina.		6	8	6	1			1				
20	Scorbutus.	1											
21	Syphilis.	197	172	144	152	136	123	159	194	159	139	158	134
22	Tachoma.												
23	Tuberculosis pulmonum.	42	83	25	24	38	36	30	27	30	30	18	21
24	Tuberculosis ceterorum organorum.												
25	Typhus abdominalis.	26	22	52	29	27	34	40	65	78	81	67	44
26	Typhus exanthematicus.												
27	Varola.	9	18	20	25	15	2	2	2	3	5	3	8
28	Morbi auris.	110	102	109	87	90	83	85	69	65	78	63	58
29	Morbi cordis.	47	43	39	49	33	31	48	33	41	48	53	44
30	Morbi cutis.	1,029	864	905	967	897	928	908	1,000	858	862	802	676
31	Morbi mentis.	9	12	16	20	6	13	12	18	9	14	5	4
32	Morbi oculi.	137	117	135	134	117	84	89	112	109	107	111	95
33	Morbi systemat. urin. et sexual (excl. ven. et syphilis).	137	119	137	161	132	146	129	146	152	123	100	129

c Including malarial cachexia.

b Not tabulated separately.

a Acute not tabulated separately.

Respectfully submitted.

Hon. ELIHU ROOT,
Secretary of War.

R. M. O'REILLY,
Surgeon-General, U. S. Army.

REPORT OF THE PAYMASTER-GENERAL.

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ANNUAL REPORT OF THE PAYMASTER-GENERAL.

WAR DEPARTMENT,
PAYMASTER-GENERAL'S OFFICE,
Washington, September 15, 1903.

SIR: I have the honor to submit the following report of this office for the fiscal year ended June 30, 1903:

On July 1, 1902, officers of the Pay Department were charged with public funds aggregating	\$7,310,720.90
During the fiscal year these officers received—	
From the United States Treasury	33,327,928.21
From soldiers' deposits	1,888,014.37
From Army paymasters' collections	1,119,296.08
Total balances and receipts	<u>43,645,959.56</u>

Accounted for as follows:

Expended on account of pay of the Army	32,599,406.48
Expended on account of pay of the Army, war with Spain (on Treasury certificates)	81,763.85
Expended on account of extra pay to Regular Army, war with Spain (on Treasury certificates)	7,804.74
Expended on account of extra pay to volunteers, war with Spain (on Treasury certificates)	20,032.66
Expended on account of mileage to officers ^a	31,755.63
Expended on account of reimbursement to contract surgeons (on Treasury certificates)	1,250.50
Expended on account of pay of Military Academy	383,838.82
Expended on account of volunteers (Treasury certificates)	244,752.14
Total expenditures	33,370,604.82
Surplus funds deposited to credit of United States Treasurer	3,835,411.47
Army paymasters' collections deposited to credit of United States Treasurer	1,119,296.08
Balances charged officers June 30, 1903	5,320,647.19
Total	<u>43,645,959.56</u>

^a These figures represent only payments of mileage accounts involving the fiscal years 1900, 1901, and 1902; the Army appropriation act approved June 30, 1902, having provided that payments on account of "mileage to officers" during the fiscal year 1903 shall be accounted for under the general head of "Pay, etc., of the Army, 1903." For statement of aggregate amount actually disbursed on account of mileage during the past fiscal year, see pages 10 and 11 of this report.

Number and amounts of deposits received from and repaid to soldiers on discharge from July 1, 1872, to June 30, 1903.

Fiscal year ending June 30—	Deposits received.		Deposits repaid.		
	Number.	Amount.	Number.	Principal.	Interest.
1873		\$209,850.38			
1874		846,609.56			
1875		325,255.80			
1876		435,912.68			
1877	5,524	328,585.06	14,752	\$1,041,001.57	\$49,713.89
1878	5,524	346,243.94	3,182	145,667.91	8,420.24
1879	6,087	470,770.38	4,826	257,854.48	17,706.93
1880	8,635	477,174.44	8,084	392,568.93	30,680.97
1881	8,942	524,112.72	8,148	501,949.77	38,722.62
1882	6,890	448,561.83	7,570	428,482.44	31,658.73
1883	7,902	407,544.68	6,686	363,578.34	26,123.60
1884	7,114	389,287.56	8,184	404,291.57	31,124.93
1885	7,033	427,617.96	6,830	401,902.22	38,249.44
1886	7,261	469,031.55	7,835	490,506.79	46,583.23
1887	6,889	436,574.98	6,988	389,083.12	34,758.24
1888	7,409	396,944.10	6,346	323,962.97	29,327.01
1889	7,892	383,798.34	7,664	396,468.53	33,647.38
1890	7,634	395,128.82	7,206	411,039.74	41,596.60
1891	6,790	408,473.15	9,106	553,047.45	51,797.70
1892	5,570	334,464.70	8,019	410,873.15	38,894.26
1893	5,870	282,248.04	5,317	268,835.46	26,069.07
1894	5,914	361,830.76	5,786	290,088.98	27,014.32
1895	6,284	318,270.73	5,880	308,372.45	28,766.42
1896	8,778	420,338.87	6,486	359,200.43	38,614.66
1897	17,878	535,392.64	6,976	345,559.55	34,850.53
1898	21,856	613,513.51	17,377	561,518.64	45,815.61
1899	37,842	1,496,762.31	28,508	988,774.63	61,273.96
1900	91,461	3,215,544.66	27,571	1,028,146.34	43,234.89
1901	111,004	3,488,529.11	78,943	2,955,169.39	114,750.37
1902	80,833	2,660,250.66	129,271	3,708,820.19	190,957.77
1903	55,551	1,888,014.37	59,968	2,134,191.91	123,298.43
Total		23,177,618.27		19,860,946.95	1,283,641.84
Amount remaining to credit of depositors		3,316,671.32			

NOTE.—Repayment of deposits to soldiers from July 1, 1872, to June 30, 1876, were not recorded by fiscal years. The repayments of 1877 include all deposits repaid prior thereto.

The above table gives a complete history of soldiers' deposits since the passage of the act authorizing them May 15, 1872. As will be seen by reference to the table, the number and amount of the deposits varied comparatively little from the beginning of the system until the fiscal year of 1897 and the breaking out of the Spanish war.

The deposits reported as repaid for the fiscal year 1902 was an estimated amount. The actual repayments are now reported in above table.

DISBURSEMENTS IN ALASKA.

Owing to the long period each year during which it is impracticable to ship funds to Alaska for the payment of troops stationed at Forts Davis, Egbert, Gibbon, and St. Michael, and the cessation of the unsatisfactory method by which payment was secured by them through an Alaskan trading company, it was determined to appoint the commanding officers of these posts as acting paymasters and supply them with sufficient funds to make payment to the troops.

This arrangement was carried into effect and funds shipped as follows: To the commanding officer at Fort Davis, \$23,500 on July 6, on steamer *Senator*; to the commanding officer at Fort Egbert, \$28,000; Fort Gibbon, \$28,500, and Fort St. Michael, \$29,000, all on steamer *Roanoke*, July 9; total, \$109,000.

The commanding officers of these posts will make payments at regular pay periods and render their accounts therefor to this office as soon as practicable after each payment, as now done by the acting paymaster of the United States legation guard at Peking, China.

The payment of the posts at Skagway and Fort Liscum will continue to be paid as heretofore by the paymasters of the Department of the Columbia, Portland, Oreg.

TRANSFERS BY CABLE.

In my last annual report it was stated that between September 26, 1899, and August 28, 1902, \$12,490,818.04 in cash had been deposited with the chief paymaster, Division of the Philippines, by Manila banking institutions and others for New York exchange. Since the latter to the present date \$1,794,670 in cash has been so received or a total to date of \$14,285,488.04. Add to this \$28,024,550 sent out by Government transports and the total of cash to date for the payment of Philippine troops is \$42,290,038.04.

The Philippine treasury having been designated a United States depository for disbursing officers since November 1, 1902, it is believed that shipment of cash from the United States will cease as soon as that agency of the Government shall have accumulated sufficient United States funds for the needs of such creditors as may be entitled to them.

PAYMENTS IN THE PHILIPPINES.

The following extract from the annual report of the chief paymaster, Division of the Philippines, indicates the very satisfactory manner in which the duties of the pay corps are discharged in the Philippine Islands:

The payments to the troops have been bimonthly at some stations and monthly at others, depending upon the location of the stations and the amount and kind of water transportation available. In the Department of Luzon, up to the muster of May 31, 1903, all troops, except those garrisoning the post of Manila, were paid bimonthly. At the request of the commanding officer, Second Brigade, and commencing with the muster of May 31, all troops on the line of the Manila and Dagupan Railroad have been paid monthly.

In the Department of the Visayas it has not been practicable until quite recently to pay the troops oftener than bimonthly at any points except those at which paymasters were stationed. With the establishment, however, of a regular bimonthly inter-island transport service, it has been possible for the paymasters stationed at Iloilo to reach and pay the larger posts on the coast monthly.

In the Department of Mindanao, owing to the distances and difficulty of securing transportation, monthly payments have been undertaken at Zamboanga only.

Generally speaking, payments to the troops have been made promptly, and it may be stated without fear of contradiction that whenever delays have occurred it must be charged to the lack of adequate water transportation, for at no time since the occupation of these islands has there been a lack of funds or officers of this department to promptly perform the duties for which they were commissioned. And in this connection it is a pleasure to call attention to the zeal, cheerfulness, and energy at all times shown by the officers and clerks of the department in the performance of their duties. While it is true that owing to the reduction of the force the abandonment of many small stations in the interior and the concentration of the troops into large posts the work of the pay department in the Philippines has been made somewhat easier than formerly, it is also true that the duties are still at times hard and exacting, the trips long and arduous, and the hardships severe. All of this has been cheerfully borne, and the entire force is to be congratulated on the fine record it has made.

The payment of civilian scouts attached to native scout companies, all of whom were discharged April 30, 1902, is believed to be about completed, and in accordance with the instructions of the auditor of the Philippine Islands the balance (\$5,416.10) remaining on hand of the amount appropriated for their payment by the Philippine Commission was covered into the Philippine treasury June 22, 1903.

Funds for the payment of the troops on duty as United States legation guard, Peking, China, are furnished by the chief paymaster of the division, on requisition of the commanding officer of the guard, but the only shipment of this kind made since December, 1901, was one of \$10,000 gold coin, May 9, 1903.

The establishment of the treasury of the Philippine Archipelago and its designation as a United States depository for funds of disbursing officers, which occurred November 1, 1902, has been of the greatest help in transacting the business of this

department. It has not only relieved this office of the responsibility of caring for very large sums of money, but has provided a check which is accepted at par all over the islands, in place of a check drawn on the United States which was generally accepted with reluctance (except by those who wished to remit to the United States) on account of the difficulty in negotiating it.

All shipments of funds from the United States for the payment of troops during the fiscal year have been made in United States notes, except a shipment of \$1,000,000, arriving May 27, 1903, which was in gold eagles and double eagles. This was done in accordance with the request of the treasurer of the Philippine Archipelago, and with the view of not only reducing the disproportionate amount of silver, minor coin, and smaller denominations of notes on hand, but also to assist in establishing a gold reserve in the Philippine treasury.

It has been recommended by inspecting officers and others from time to time that troops, especially native scouts, at isolated points be paid in Mexican currency, if desired, the reason therefor being that troops so located are seldom able to get the full benefit of the discount on this kind of currency, and are therefore not on the same footing as regards pay as those more fortunately situated. This is undoubtedly true, and this office would be glad to recommend that payments be made, when so desired, and especially to native scouts serving at isolated stations, in Mexican currency, were it not prohibited by law. "No exchange of funds shall be made by any disbursing officer or agent of the Government of any grade or denomination whatever or connected with any branch of the public service other than exchange of gold, silver, United States notes, and national-bank notes, and every such disbursing officer, when the means for his disbursements are furnished him in gold, silver, or United States notes, shall make his payments in the moneys so furnished." (R. S., 3651.)

The deposits for the last year were a little over \$1,000,000 and the disbursements were a little less than \$8,250,000, while the deposits for the preceding year were something less than \$2,000,000 and the disbursements about \$14,000,000. The proportion, therefore, of deposits to disbursements this year is a little less than that of last year.

Very respectfully,

Geo. R. SMITH,
Major and Paymaster, U. S. Army, Chief Paymaster.

Payment of troops in the Philippine Islands—Funds sent, soldiers' deposits, etc., during the fiscal year ending June 30, 1903.

Balance in hands of paymasters July 1, 1902.....	\$4, 372, 477. 80	
Cash sent to Manila by United States transports during fiscal year 1903	2, 580, 000. 00	
Received from soldiers' deposits during fiscal year...	1, 027, 871. 97	
Received from transfers by paymasters serving in the United States, July 1, 1902, to June 30, 1903.....	5, 837, 290. 55	
		\$13, 817, 640. 32
Unexpended balances deposited to credit of Treasurer of the United States, July 1, 1902, to June 30, 1903..	2, 870, 243. 63	
Transferred to paymasters serving in the United States and China, July 1, 1902, to June 30, 1903	10, 086. 53	
Disbursed by paymasters, July 1, 1902, to June 30, 1903.....	8, 283, 821. 84	
		11, 164, 152. 00
Balance to credit of paymasters, June 30, 1903.....		2, 653, 488. 32

OFFICERS' DEPOSITS.

It is much to be regretted that the House of Representatives, at its last session of Congress, failed to adopt the Senate provision in the Army appropriation bill, for the deposit, by officers of the Army on the active list, of their savings upon the terms provided for enlisted men under the act of May 15, 1872. Very few officers have at any time more money than will meet their current needs, but in times of hostilities and during foreign service, when officers would presumably be far removed from banking institutions or opportunities to use them, it would be to their incalculable advantage and mental relief if they were privileged to deposit a part of their monthly pay for safe-keeping by the Government. It is not necessary that the officer should receive the same interest on deposits that enlisted men are allowed; 2½ or 3 per cent would doubtless be entirely satisfactory to them.

Aside from considerations of accommodation of the officer, the safe-keeping of his savings and certain provision for his family through undrawn deposits in event of death, the Government, by the adoption of such a system, would encourage prudent and thriftful habits in the commissioned as well as the enlisted forces of the Army. The following provision is therefore recommended for insertion in the Army appropriation bill for the fiscal year ending June 30, 1905, under the heading "Pay of officers:"

Provided, That so much of sections 1305, 1306 (as amended by the act of March 3, 1883), 1307, and 1308, Revised Statutes, as relates to deposits of pay and interest thereon, is hereby extended to all officers of the Army on the active list, but with such provision for repayment of said deposits as may be prescribed by the President: *Provided further*, That the gross amount of said deposits in any one year shall not exceed half of the pay of the officer for such year, and the rate of interest payable on officers' deposits shall not exceed — per cent.

DETAILS FROM THE LINE.

In my last annual report I stated:

The present law detailing captains from the line for duty in the Pay Department works admirably. The only change that I would recommend in this connection would be that recommended by me in my annual report for 1901, that instead of the details being made from the captains of the line they be made from first lieutenants of the line, and the officers so detailed given the rank, pay, and allowances of captains, mounted, during their tour of service.

I renew the recommendation made in 1901 and 1902.

LONGEVITY UNDER THE WATSON DECISION.

The Supreme Court, in *United States v. Watson*, decided March 11, 1889, that service as a cadet in the Military Academy should be reckoned in computing longevity pay prior, as well as subsequent, to the act of February 24, 1881; but while Congress has in a few individual cases, by special acts, provided that settlements should be made under the Watson decision, said decision, except in four individual cases, has not been accepted and followed by the accounting officers for the reason that it reversed a consistent and uninterrupted construction of

the act of July 5, 1838, from the date of its passage until it was superseded by the act of February 24, 1881, which act they claim has never been held as retroactive by them or any court.

While the claim that no court has viewed the act of February 24, 1881, as of retroactive effect may be correct, the Supreme Court in the case of Watson gave to the act of July 5, 1838, practically the same construction given by the courts and conceded by the accounting officers as the proper construction of the act of February 24, 1881.

With a view of giving the Watson decision general effect prior to February 24, 1881, and thus giving to the act of July 5, 1838, the construction placed upon it by the Supreme Court of the United States, it is recommended that the accompanying bill be presented to Congress at its next session. It has the approval of the Auditor for the War Department, and in my judgment will give relief to such officers of the Army as are debarred by the accounting officers from the benefits conferred upon Watson by the Supreme Court decision.

Be it enacted, etc., That in the settlement of claims for longevity pay and allowances on account of services of officers of the Regular Army, arising under the act of July 5, 1838, and amendments thereof, the accounting officers of the Treasury shall, without regard to the lapse of time, credit as service in the Army of the United States, within the meaning of that act and its amendments, all services rendered as a cadet at the United States Military Academy and as an enlisted man or commissioned officer in the Regular and Volunteer armies, and no settlement heretofore made shall preclude a settlement under the terms of this act, and there is hereby appropriated, out of any money in the Treasury not otherwise appropriated, a sufficient sum to pay the amounts found due by the accounting officers under the provisions of this act.

MILITIA.

The provisions of the new militia law (act January 21, 1903), when fully availed of by all the States, must result in a material increase in the work of the office, as all accounts for payments to militia, whether by State disbursing officers under section 14 or by army paymasters under section 15, will be required to pass the administrative scrutiny of the office before transmittal to the Auditor for the War Department. Thus far 14 States have participated, or given notice that they will participate, with regular troops in maneuvers under section 15, involving payments by army paymasters of 22 regiments and several battalions, separate companies, and detachments, and it is probable that during the season more than that number will be paid by State disbursing officers under section 14.

CLERICAL FORCE.

I again desire to commend the industry and efficiency of the clerical force of this office. All demands upon them for work at extra hours have been promptly and cheerfully responded to, with the result that all arrearages of work consequent upon the muster out of the late volunteers and the reduction of the Army to its present strength have been brought up to date, and it is believed that the business of the office has never been more promptly transacted than at the present time. The reduction of the enlisted strength of the Army does not,

however, in the same degree diminish the work of the office, as the number of organizations and officers remains the same, requiring the same number of vouchers and pay rolls to be handled, examined, and disposed of.

Attention is invited to the following tables showing the work of the Pay Department during the year.

Very respectfully,

A. E. BATES,
Paymaster-General U. S. Army.

The SECRETARY OF WAR.

Mileage disbursements for the fiscal year ending June 30, 1903.

	Certi- fied claims.	Mileage.			Pay of the Army, 1903.
		1900.	1901.	1902.	
Inspection of the Army:					
By the General Commanding the Army, accom- panied by his aids, and the generals com- manding the several military departments, accompanied by officers of their staffs, as pro- vided by paragraph 211, Army Regulations.				\$465.20	\$11,837.47
By officers of the Adjutant-General's Depart- ment.....					191.30
By officers of the Inspector-General's Depart- ment.....				581.52	8,613.39
By officers of the Quartermaster-General's De- partment.....				299.27	8,428.34
By officers of the Commissary-General's De- partment.....				182.60	4,582.11
By officers of the Medical Department.....				628.46	7,553.19
By officers of the Ordnance Department.....			\$5.60	920.98	9,809.45
By officers of the Engineer Department.....				88.48	897.62
By officers of the Signal Corps.....				520.78	5,664.48
By officers of artillery (artillery inspection) ..				38.62	311.32
Inspection by line officers of—					
Troops.....				54.82	1,053.06
Horses.....				33.74	1,194.25
Buildings.....					10.08
Engineer and other property.....					431.15
Artillery districts, G. O. 81, 1901, and G. O. 27, 1903.....				92.40	1,893.73
Old ordnance.....				31.50	143.68
Powder and high explosives.....				25.90	98.28
Submarine mines.....					856.17
Cemeteries.....				24.64	13.44
Colleges.....					1,245.91
Semiautomatic sight for 8-inch breech- loading rifle.....					67.90
Siege gun equipments.....					47.74
Post schools.....					142.06
Electrical installation.....					124.06
Water supply at West Point.....					117.60
Water supply at Fort Bayard.....					6.44
Militia and instruction of the National Guard.....				77.21	5,881.28
Total for inspection of the Army.....			5.60	3,913.57	70,715.50
Change of station.....		\$13.58	614.66	12,760.16	187,087.96
Travel of general officers and their aids other than for inspection.....				32.08	2,209.81
Travel in Europe and other foreign countries.....				158.87	3,066.74
Recruiting duty.....				2,756.69	41,740.91
Courts-martial and courts of inquiry, to and from..				623.90	14,281.62
Payment of troops.....				271.97	8,079.10
Officers of the line ordered to express offices to obtain money for payment of troops.....				1.20	92.84
Treasurer and professor Military Academy (Mili- tary Academy duty).....					240.66
Instructions of Secretary of War (confidential duty).....				188.41	5,317.15
Target practice, inspection of target ranges and rifle team.....				42.08	3,110.62
Conducting prisoners sick and insane.....			30.31	149.82	3,858.08
Attending funerals of officers and other deceased officials.....					109.84
Line officers on business for Quartermaster and Commissary Department.....				382.92	3,128.49
Retiring boards and officers retired and ordered home.....				747.31	6,270.46
Boards of examination to examine officers for pro- motion.....			36.38	735.07	8,469.80
Boards of survey.....				9.28	313.60
Boards of examination of officers at post schools, G. O. 102, 1902.....					1,098.09
Boards of examination of gunners, G. O. 97 and 126, 1902.....			7.20		2,398.95
Boards on rent, Philippine Islands.....				62.69	90.92
Board on War College.....					122.51
Board on General Staff.....					390.76
Board on buildings at military posts for post ex- change schools, etc., paragraph 16, S. O. 266, 1902..					39.20
Board on uniform.....				349.49	559.06
Board on brevet rank.....					22.92
Board on small-arms firing regulations.....					118.66
Board on drill regulations, Coast Artillery.....					162.59
Board on Manual Coast Artillery.....					1,018.66

Mileage disbursements for the fiscal year ending June 30, 1903—Continued.

	Certi- fied claims.	Mileage.			Pay of the Army, 1903.
		1900.	1901.	1902.	
Board on mustering regulations.....					\$92.26
Board on drill regulations, Hospital Corps.....					171.72
Board on pack outfit for mountain artillery.....					47.74
Board on disappearing-gun carriage ^a					1,209.83
Board on test of new rifle.....					478.21
Board on test of submarine torpedo boat <i>Protector</i>					29.64
Board on purchase land at Monterey, Cal.....					15.70
Board on purchase land at forts Andrews and Heath.....				\$2.31	4.78
Board on purchase land at Fort Foster.....					43.78
Board on military site, Indianapolis, Ind.....					252.42
Board on military site, Chickamauga Park, Ga.....				58.52	354.48
Board on sale site of Columbus Barracks.....					476.84
Board on sites at Cushings Island.....					46.08
Board on barracks at Fort Douglas.....					176.96
Board on civil assessments at Fort Monroe.....					46.76
Board on water supply at forts Flagler, Worden, and Casey.....					103.69
Board on water supply at West Point.....					39.20
Board on Fort Sill Reservation.....					483.66
Board on buildings at Point Boneta.....					2.46
Board on stables at Fort D. A. Russell.....					46.64
Board on athletic instructions.....					302.75
Board on athletic tournament.....					607.90
Board on inspection Surra and infectious diseases of horses in India.....					2,872.87
Board on range and position finder.....					246.35
Board to appraise sloop <i>Esperanza</i>				43.54	
General staff.....					3,022.75
General service and staff college at Fort Leaven- worth, paragraph 80, S. O. 164.....					9,488.22
Leases and other legal business.....					215.25
Topographical work.....					6.40
Information for artillery school at Fort Monroe.....					181.52
Military sites and barracks in Philippine Islands.....					290.01
Friar settlement.....				711.90	721.14
Witnessing test submarine boat.....					44.94
Witnessing maneuvers of Prussian army.....					4,008.48
Attending ceremonies of the coronation of King Edward VII and inspection Krupp field artillery at Essen, Germany.....				277.76	547.33
Attending encampment Grand Army of the Re- public.....					51.10
Attending the dedicatory ceremonies of the Loui- siana Purchase Exposition.....					1,336.71
Attending Interstate National Guard Association.....					197.82
Naval maneuvers.....					70.81
Army and Navy maneuvers, 1902.....				64.16	4,712.03
Army and Navy maneuvers, 1903.....					769.46
Army maneuvers at Fort Riley.....					5,292.17
Artillery instructions at Indianhead.....				28.56	685.44
Martinique expedition ^a				35.44	
Relief South Carolina and Kansas flood sufferers.....					58.66
Consultation with department commander.....					191.46
Special investigations.....				4.32	370.74
Fire control installation.....				214.85	1,615.05
Duty as engineer of department.....				32.86	1,041.69
Site of field maneuvers.....					61.74
Examination of electricians.....					34.18
War College.....					177.24
Census Philippine Islands.....					19.44
National trophy marksmanship, G. O. 61, 1903.....					181.88
Insular affairs.....					9.04
Certified claims.....	\$49.14				
Treasury certificates (duty not shown).....		\$39.57	\$1,186.74	502.34	
Orders fail to state specific duty enjoined.....		.85	43.12	149.48	194.93
Total	49.14	53.50	1,924.01	25,310.40	407,765.44

^a These amounts have been refunded to the Pay Department, the same not being payable out of the funds of this Department.

Statement showing the balance in the hands of each disbursing officer of the Pay Department, United States Army, on the 1st of July, 1908; the amount remitted to each from the United States Treasury, or turned over by other agents during the fiscal year ending June 30, 1909; the amounts accounted for by accounts and vouchers of expenditures, or by transfer or replacement in the Treasury, and the balance remaining in the hands of paymasters to be accounted for in the next fiscal year.

Bank and name.	Balance in hands of each paymaster on June 30, 1908.	Remitted from the Treasury in the year ending June 30, 1909.	Received from other paymasters.	Received from soldiers' deposits.	Received from paymasters' collections.	Total received and to be accounted for.	Surplus funds deposited in the Treasury.	Paymasters' collections deposited in the Treasury.	Expenditures.	Transferred to other paymasters.	Balance in hands of each paymaster on June 30, 1909.	Total accounted for.
<i>Colonels and assistant paymasters-general.</i>												
Coxe, F. M.	\$587,014.44	\$8,050,000.00	\$1,298,076.06	\$8,650.15	\$3,400.11	\$9,987,549.76	\$303,971.24	\$3,400.11	\$728,944.04	\$8,568,452.98	\$382,781.39	\$9,987,549.76
Town, A. S.	111,208.79	1,085,000.00	540,000.00	25,381.51	14,758.02	1,776,848.32	76,628.18	14,758.02	848,354.98	776,188.66	60,418.48	1,776,848.32
Shiffin, C. C.												
<i>Lieutenant-colonels and deputy paymasters-general.</i>												
Baird, G. W. b.	927,827.95	10,323,849.98	6.07	15,856.66	29,727.06	11,296,267.72	325,000.00	29,727.06	2,158,557.18	8,782,983.48	11,296,267.72	
Dodge, F. S.	142,610.08	5,037,000.00	259,964.26	20,800.92	2,922.49	5,462,987.75	84,255.44	2,922.49	1,408,836.84	8,906,588.88	118,384.10	5,462,987.75
Whipple, C. H.	2,861,999.67	1,780,000.00	6,729,357.26	5,307.00	8,055.54	11,879,719.47	765,495.02	8,055.54	700,830.80	9,001,333.97	1,098,504.64	11,879,719.47
Comery, W. H.			981,835.26	21,808.24	8,483.12	8,006,199.86	61,821.92	8,483.12	813,749.18	2,057,393.04	64,777.60	8,006,199.86
Tucker, W. F.	89,553.61	994,000.00	321,069.69	62,190.10	18,878.09	1,475,481.49	81,888.81	18,878.09	531,996.60	728,672.72	164,846.18	1,475,481.49
<i>Major and paymaster.</i>												
Muhlenberg, J. C.		285,000.00	518,186.46	11,156.63	16,086.58	810,488.62	7,792.66	16,086.58	578,231.81	196,944.92	9,373.70	810,488.62
Smith, G. R.	247,250.00		8,906,778.31	39,506.84	14,270.06	4,107,804.21	8,538.43	14,270.06	293,691.38	2,174,471.17	1,616,833.22	4,107,804.21
Halford, E. W.	122,841.27		749,756.81	16,772.26	7,410.86	896,779.68		7,410.86	631,864.08	186,967.61	121,047.14	896,779.68
Kilbourne, C. E.	41,971.29	796,000.00	229,969.77	42,898.28	2,926.38	1,133,290.72	5,765.79	2,926.38	599,944.87	481,242.79	38,410.69	1,133,290.72
Bullis, J. L.			740,205.50	94,031.88	18,108.21	862,345.59		18,108.21	163,068.04	209,640.24	209,640.24	862,345.59
Rogers, H. L.	38,808.71		570,818.54	9,896.88	16,873.56	641,673.88		16,873.56	559,860.00	29,138.16	35,807.12	641,673.88
Watrous, J. A.	41,099.09		337,235.38	9,896.88	8,501.26	396,732.06		8,501.26	181,078.19	176,686.77	35,176.99	396,732.06
Gilbert, W. W.	29,264.63		515,451.92	22,967.21	27,863.01	783,566.77		27,863.01	523,387.00	123,816.38	67,811.90	783,566.77
Rees, H. L.	61,626.88		619,672.72	29,454.17	28,488.81	944,241.58		28,488.81	724,625.04	176,686.77	67,811.90	944,241.58
Vinson, W.	89,296.00		539,200.00	69,357.96	29,989.47	867,347.87		29,989.47	643,448.18	161,810.49	46,756.02	867,347.87
Newbold, Chas. C.	13,923.11	70,000.00	746,337.66	746,337.66	29,243.56	887,843.48	7,739.04	29,243.56	698,554.78	161,810.49	145,890.72	887,843.48
Wallace, H. S.	89,100.17		298,920.48	38,746.54	11,677.91	438,445.10		11,677.91	396,567.47	16,520.96	20,026.79	438,445.10
Payson, F. L.	22,158.28		865,380.35	15,864.59	10,816.87	413,964.59		10,816.87	645,798.29	511,812.38	35,224.14	2,213,660.82
Downey, G. F.	94,583.88		514,943.98	81,569.57	25,263.64	654,523.71		25,263.64	419,186.98	154,523.71	47,806.79	654,523.71
Goodman, T. C.	135,444.68		444,462.92	41,611.84	25,452.87	646,971.80		25,452.87	696,068.79	285,824.82	182,696.80	646,971.80
Houston, J. B.	121,614.82		1,011,137.61	71,836.46	17,791.12	1,222,379.53	150,000.00	17,791.12	634,545.90	230,972.79	47,846.66	1,222,379.53
Ray, B. B.	163,961.34		599,907.42	56,978.59	20,252.96	883,120.38		20,252.96				883,120.38

Lord, H. M.	619,982.55	54,999.10	21,414.78	686,398.43	21,414.78	540,678.48	20,725.79	113,577.38	686,398.43
Reichsger, W. B., Jr.	1,822,305.54	42,004.14	23,408.82	1,867,713.50	23,408.82	1,822,305.54	935,401.44	1,908,708.98
Smith, R. S.	290,752.54	46,187.24	17,104.24	473,585.17	658.67	292,162.50	163,610.06	473,585.17
<i>Captains and paymasters.</i>									
Howell, S.	521,213.95	143,060.08	28,744.89	770,624.16	28,744.89	691,159.11	50,720.16	770,624.16
Holloway, G. T.	885,000.00	25,087.25	82,237.82	994,581.35	82,237.82	945,677.89	50,484.82	5,658.76	994,581.35
Gambrell, W. G.	1,261,161.81	35,054.12	19,238.57	1,375,972.68	461.96	1,375,972.68	650,045.30	110,164.75	1,375,972.68
Kaleber, T. D.	468,140.00	37,831.06	20,658.28	526,629.34	20,658.28	507,469.01	9,347.46	526,629.34
Schofield, W. B.	619,738.17	21,821.90	24,880.77	666,039.67	24,880.77	641,258.90	16,792.92	25,981.89	666,039.67
Pickett, G. E.	727,400.00	119,051.28	39,538.72	885,989.00	39,538.72	846,450.28	82,082.58	124,866.26	885,989.00
Becker, Otto	731,810.49	87,907.88	28,610.91	847,329.27	28,610.91	818,718.36	58,058.63	14,878.46	847,329.27
Curry, M. B.	809,223.64	42,498.39	34,949.83	894,291.97	34,949.83	859,342.14	87,379.28	70,586.80	894,291.97
Dawes, J. W.	797,048.57	26,662.45	29,082.57	852,294.97	29,082.57	823,212.40	24,426.28	852,294.97
Wilkins, J. S.	315,546.27	9,282.61	10,163.48	334,992.36	10,163.48	324,828.88	57,818.54	334,992.36
Canby, James	119,457.64	225,089.93	26,768.57	969,737.79	26,768.57	772,092.67	17,819.81	83,750.32	969,737.79
Coffin, Eugene	29,627.84	268,809.68	36,988.19	946,731.07	36,988.19	772,092.67	17,819.81	83,750.32	946,731.07
Varnish, T. P. d.	6,423.89	28,357.43	8,079.53	138,371.07	8,079.53	123,963.48	6,328.06	138,371.07
Lynch, J. R.	121,398.48	3,877.65	5,079.53	138,371.07	5,079.53	123,963.48	6,328.06	138,371.07
Graham, W. R.	283,607.82	28,261.64	28,692.90	724,930.93	28,692.90	696,238.03	140,258.06	21,283.22	724,930.93
Stanton, C. F.	271,883.87	20,068.83	53,605.90	971,038.60	53,605.90	917,432.70	8,138.90	26,599.83	971,038.60
Slevens, P. C.	1,400,000.00	22,646.85	30,619.13	1,464,717.89	30,619.13	1,434,098.76	11,605.41	26,599.83	1,464,717.89
Slaughter, B. D.	1,496,406.89	28,948.05	19,658.11	1,590,317.04	19,658.11	1,570,658.93	1,104,919.89	64,227.69	1,590,317.04
.....	605,369.38	71,357.09	26,623.49	714,847.81	26,623.49	619,898.12	2,000.00	66,426.20	714,847.81
<i>Captains and paymasters detailed from the line.</i>									
Blauvelt, W. F.	776,490.00	34,353.00	30,384.49	901,527.83	30,384.49	853,463.28	12,000.00	21,749.49	901,527.83
Carleton, Guy	529,290.00	72,641.75	24,754.57	627,885.36	24,754.57	583,546.09	71,940.27	68,869.85	627,885.36
Irwin, F. G.	590,156.00	14,851.69	22,828.16	627,885.36	22,828.16	585,057.20	16,415.16	627,885.36
Wittenmyer, E.	456,052.91	83,798.61	19,283.59	623,655.96	19,283.59	584,592.85	170,499.48	45,336.55	623,655.96
McAndrew, J. W.	740,000.00	84,275.78	31,062.50	805,338.28	31,062.50	744,275.78	144,568	32,355.67	805,338.28
Whipple, H. S.	364,286.38	22,853.62	16,301.27	411,531.28	16,301.27	394,278.96	26,736.76	64,219.30	411,531.28
<i>Acting paymaster.</i>									
Brewster, A. W.	60,000.00	6,906.55	4,022.91	94,187.17	4,022.91	58,385.44	13,598.66	94,187.17
Total	7,310,720.90	33,327,928.21	40,716,888.18	84,364,827.74	40,716,888.18	84,364,827.74	40,716,888.18	320,647.19	84,364,827.74

Not disbursing; assistant to Paymaster-General.

Retired February 20, 1903.

Retired June 26, 1903.

Retired February 11, 1903.

Statement of the account of the Pay Department, United States Army, with the

Appropriations.	In account with the Treasury.					Total.
	Balance in the Treasury July 1, 1902.	Amount of appropriations and transfer warrants.	Unexpended balances deposited.	Paymasters' collections deposited.	Repayments in settlement of accounts.	
Pay, etc., of the Army, 1903.....		\$32,700.79		\$496,621.73	\$94.27	\$33,197,512.41
Pay of Military Academy, 1903.....		407,867.07		87.68		407,954.75
Pay, etc., of the Army, 1902.....	\$394,303.67	1,533,092.31	\$3,654,795.39	277,123.06	708.93	5,890,023.36
Pay of Military Academy, 1902.....	887.13	4,912.00	6,342.48	.75		12,142.36
Mileage to officers traveling without troops, 1902.....	6,129.90	102,202.38	30,165.47	2,580.03		141,077.78
Pay, etc., of the Army, 1901.....	9,837,596.63		42,183.85	8,683.01	2,095.94	9,890,559.43
Pay of Military Academy, 1901.....	24,844.87					24,844.87
Mileage to officers traveling without troops, 1901.....	296,274.57	146.43	38,160.07	374.88		334,955.95
Pay, etc., of the Army, 1900 and prior years.....			14,833.98	3,734.53	375.98	18,944.44
Mileage to officers traveling without troops, 1900 and prior years.....			3,481.69	55.90		3,537.59
Pay, etc., of the Army, 1900.....	1,500,000.00					1,500,000.00
Mileage to officers traveling without troops, 1900.....	100,000.00					100,000.00
Reimbursement to contract surgeons.....	3,155.29					3,155.29
Pay of two and three year volunteers, 1871 and prior years.....					952.54	952.54
Extra pay to volunteers, war with Spain.....		26,985.00		208.33	290.44	27,483.77
Extra pay to Regular Army, war with Spain.....		25,408.55			32.40	25,440.95
Extra pay to officers and men who served in Mexican war.....						
Three months' pay proper.....						
Bounty to Fifteenth and Sixteenth Missouri Cavalry Volunteers.....						
Bounty under act of July 28, 1866.....					100.00	100.00
CERTIFIED CLAIMS.						
Pay, etc., of the Army.....	1,670.85	13,853.02				15,523.87
Mileage to officers traveling without troops.....		49.14				49.14
Pay, etc., of the Army, war with Spain, 1903.....		200,000.00			74.93	200,074.93
Pay, etc., of the Army, war with Spain, 1902.....	133,274.91		12,000.00		91.63	145,366.54
Arrears of pay, bounty, etc., 1903.....		300,000.00				300,000.00
Arrears of pay, bounty, etc., 1902.....	400.90		19,000.00		5.16	19,406.06
Arrears of pay, bounty, etc., 1901.....	9,420.60		5.14	32.10		9,457.84
Arrears of pay, bounty, etc., 1900 and prior years.....			75.70			75.70
Pay of two and three year volunteers.....	7,533.63		2,496.01		6.30	10,035.94
Pay of volunteers.....	39.43	42.66	8.17			90.26
Pay of volunteers, Mexican war.....		14.70				14.70
Pay, transportation, services, and supplies of Oregon and Washington volunteers in 1855 and 1856.....		390.63				390.63
Traveling expenses of California and Nevada volunteers.....	256.51	111.30				367.81
Bounty under act of July 11, 1862.....	25.00					25.00
Bounty under act of July 28, 1866.....	2,735.35		200.00			2,935.35
Bounty to volunteers, their widows and legal heirs.....	19,723.43		3,683.60			23,407.03
SPECIAL ACCOUNT.						
National defense (war).....				38.79		38.79
Total	12,338,272.67	35,315,871.60	3,827,431.55	789,540.79	4,828.47	52,275,945.08

* This amount, collected during the fiscal year on account of mileage overpaid officers and being general account with "National defense (war)" and dropped from the Pay Department appropriation.

appropriations subject to its control, during the fiscal year ending June 30, 1903.

In account with the Treasury—Continued.						
Amount drawn by requisition.		Amount covered into surplus fund.	Total.	Balance in the Treasury June 30, 1903.	Balance in the hands of paymasters June 30, 1903.	Total balances June 30, 1903.
On Pay Department request.	On Treasury settlements.					
\$32,320,000.00	\$3,222.98		\$32,323,222.98	\$874,289.43	\$4,944,109.22	\$5,818,398.65
390,000.00			390,000.00	17,954.75	32,499.21	50,453.96
120,000.00	12,991.35		132,991.35	5,727,032.01	203,408.28	5,930,440.29
	80.53		80.53	12,061.83		12,061.83
5,000.00	309.95		5,309.95	135,767.83	25,009.60	160,777.43
80,000.00	48,304.82	\$9,782,254.61	9,890,559.43		8,036.36	8,036.36
	192.34	24,639.53	24,831.87	13.00		13.00
	1,686.73	333,289.22	334,955.95		3,893.83	3,893.83
		18,944.44	18,944.44			
		8,537.59	8,537.59			
	1,500,000.00		1,500,000.00			
	100,000.00		100,000.00			
2,000.00	114.91		2,114.91	1,090.38	1,687.77	2,728.15
		952.54	952.54			
25,000.00	2,483.77		27,483.77		21,271.41	21,271.41
20,000.00	5,440.95		25,440.95		24,821.20	24,821.20
					852.00	852.00
					328.78	328.78
					391.66	391.66
		100.00	100.00			
10,725.11	3,127.91		13,853.02	1,670.85	1,666.06	3,336.91
49.14			49.14			
100,000.00	21,356.14		121,356.14	78,718.79	20,177.74	98,896.53
	211.74		211.74	145,154.80	1,161.27	146,316.07
255,000.00	9,220.52		264,220.52	35,779.48	28,215.99	63,995.47
	33.31		33.31	19,372.75	2,845.45	21,718.20
		9,457.84	9,457.84		771.36	771.36
		75.70	75.70			
	155.91	9,890.03	10,035.94			
42.66			42.66	47.60		47.60
	14.70		14.70			
	390.63		390.63			
111.30			111.30	256.51		256.51
				25.00		25.00
		2,935.25	2,935.25			
	100.00	23,307.03	23,407.03			
	38.79		38.79			
33,327,928.21	1,709,477.98	10,189,353.88	45,226,760.07	7,049,185.01	5,820,647.19	12,389,832.20

no longer subject to control of the Pay Department, was carried, on June 30, 1903, to credit of the tion ledger.

Statement showing the number of pay trips made, number of days consumed in travel, posts paid, and amount of field and office disbursements made by each disbursing officer of the Pay Department, U. S. Army, during the fiscal year ending June 30, 1903.

Rank and name.	Num-ber of pay trips.	Days con-sumed.	Num-ber of posts paid.	Miles traveled.					Payments.			Remarks.	
				Ambul-ance.	Stage.	Rail-road.	Steamer.	Other convey-ance.	Total.	In field.	In office.		Total.
Colonels and assistant paymasters-general:													
Coxe, F. M.	4	21	45				3,346					\$728,944.04	\$728,944.04
Towar, A. S.									54			756,039.41	848,354.96
Lieutenant-colonels, dep-uty paymasters-General:													
Baird, G. W.	24	32	52	64			596		1,924				
Dodge, F. S.			50										
Whipple, C. H.			17										
Comerys, W. H.			112										
Tucker, W. F.	11	22	112				4,364		264				
Majors and paymasters:													
Mahlenberg, J. C.	6	25	15	50			5,608						
Smith, G. R.	11	44	31	12					2,990				
Halford, E. W.	4	8	13	28			793		267				
Kilbourne, C. E.	8	17	46	156			4,378						
Bullis, J. L.	7	108	47	110			98		4,954				
Rogers, H. L.	22	32	55	112	152								
Watrous, J. A.	5	10	14	44			3,914						
Gilbert, W. W.	7	10	52	4			1,170						
Rees, H. L.	18	48	79	150	4		1,488						
Vinson, W.	6	49	88	397	272		4,118						
Newbold, Chas.	11	12	72	20			272		1,668				
Wallace, H. S.	3	45	27	9			266						
Payson, F. L.	6	14	16	90			572		2,197				
Downey, G. F.	2	2	63	12			28						
Goodman, T. C.	9	64	86	93					1,332				
Houston, J. B.	3	48	29	46					2,751				
Ray, B. B.	10	45	63	188			330		4,119				
Lord, H. M.	14	78	62	143			122		4,119				
Rochester, W. B., Jr.	73	42	73	384			882						
Smith, R. S.	9	39	51	24			2,021		450				
Captains and paymasters:													
Howell, S.	16	137	65	222					7,494				
Promoted, major, June 26, 1903.													
Holloway, G. T.	12	48	74				4,997						
Gambrell, W. G.	31	93	73	336			72		233				
Kiecher, T. D.	18	127	73	231			242		5,784				
Schofield, W. B.	10	80	44	134			1,570		845				
Pickett, G. E.	27	99	103	273			229		5,843				

Resigned Feb. 11, 1903.										
Becker, Otto.....	58	58	86	75	1,794	2,662	4,531	393,536.17	414,712.24	806,248.41
Curry, M. B.....	12	42	121	80	8,280	80	8,960	222,432.70	497,775.01	720,207.71
Dawes, J. W.....	29	39	66	76	3,543	314	3,853	279,586.03	548,855.82	828,441.85
Wilkins, J. S.....	5	24	22		2,924		2,924	119,506.14	147,504.10	267,010.24
Canby, Jas.....	19	28	74		2,464		2,464	140,185.55	632,507.12	772,692.67
Coffin, Eugene.....	57	108	185	108	5,466	1,065	6,534	462,438.37	247,731.45	710,164.82
Varney, T. P. b.....	2	13	13					128,963.48		123,963.48
Lynch, J. R.....	17	32	29	36	5,484		5,520	215,545.63	320,181.03	536,726.66
Graham, W. R.....	24	44	24		4,759		4,759	547,953.50	299,607.43	847,460.93
Stanton, C. E.....	48	59	72	30	770	606	1,346	1,143,630.09	252,417.08	1,396,047.17
Stevens, P. C.....	11	60	50	139	2,310	1,231	3,540	253,973.16	157,478.19	411,451.35
Slaughter, B. D.....	15	84	84	352	596	2,888	3,798	467,716.43	162,181.69	619,898.12
Detailed from the line:										
Blauvelt, W. F.....	26	61	76	162	58	3,547	7,157	309,105.66	524,357.62	833,463.28
Carleton, Guy.....	29	123	89	253		6,227	5,612	460,308.90	75,237.29	535,546.09
Irwin, F. G.....	21	26	48	6	1,558	274	1,838	184,158.71	404,433.82	588,592.53
Wittenmyer, E.....	6	57	16	64	122	1,279	1,717	284,920.86	108,635.96	393,556.84
McAndrew, J. W.....	28	30	50	278	698		976	354,078.38	387,697.20	741,775.58
Whipple, H. S.....	8	11	33		200	72	272	165,866.48	138,407.47	304,273.95
Acting paymaster:										
Brewster, A. W.....									58,335.44	58,335.44
Total.....	802	2,258	2,828	4,853	313	87,145	158,655	13,427,923.94	19,942,681.48	33,370,604.82

^aNot on disbursing duty. Assistant to the Paymaster-General.
^bMiles traveled not stated, no report having been received from paymaster.

PAYMASTER-GENERAL'S OFFICE,
 September 12, 1903.

**REPORT OF THE CHIEF OF ENGINEERS,
MILITARY AFFAIRS.**

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REPORT OF THE CHIEF OF ENGINEERS, MILITARY AFFAIRS.

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, September 29, 1903.

SIR: I have the honor to present for your information the following report upon the duties and operations of the Engineer Department for the fiscal year ending June 30, 1903:

OFFICERS OF THE CORPS OF ENGINEERS.

The number of officers holding commissions in the Corps of Engineers, U. S. Army, at the end of the fiscal year was 153.

Since the last annual report the Corps of Engineers has lost 7 of its officers—Second Lieut. Francis F. Longley, who resigned September 2, 1902; Capt. Robert McGregor, who died December 23, 1902; Lieut. Col. Andrew N. Damrell, who was retired from active service on account of disability incident thereto, January 29, 1903, under the provisions of section 1251, Revised Statutes; Col. Samuel M. Mansfield, Col. Jared A. Smith, and Col. Peter C. Hains, who were appointed brigadier-generals, United States Army, February 20, April 13, and April 21, 1903, respectively; and First Lieut. Edmund M. Rhett, who resigned June 4, 1903.

There were added to the Corps of Engineers, by promotion of graduates of the Military Academy, 10 second lieutenants on June 22, 1903, to rank from June 11, 1903.

On the 30th of June, 1903, the officers were distributed as follows:

Commanding the Corps of Engineers and Engineer Department, Board of Ordnance and Fortification, and War College Board.....	1
Office of the Chief of Engineers, Provisional General Staff, and Light-House Board.....	1
Office of the Chief of Engineers.....	5
Division engineer and The Board of Engineers.....	1
Division engineer, river and harbor works, and light-house district.....	1
Division engineer, river and harbor works, The Board of Engineers, and Light-House Board.....	1
Division engineer, Mississippi River Commission, river and harbor works, and engineer officer, Department of the Lakes.....	1
Division engineer, California Débris Commission, and engineer officer, Department of California.....	1

Fortifications, river and harbor works, and light-house districts	6
Fortifications and river and harbor works	14
The Board of Engineers, river and harbor works, and International Congress ..	1
Washington Aqueduct	2
River and harbor works	15
The Board of Engineers and engineer officer, Department of the East	1
Division engineer, fortifications, river and harbor works, and California Débris Commission	1
River and harbor works and light-house districts	3
Fortifications and light-house district	1
Division engineer, Mississippi River Commission, fortifications, and river and harbor works	1
Division of the Philippines	20
Division engineer, fortifications, and river and harbor works	1
Light-House Establishment	2
En route from the Philippine Islands	9
Provisional General Staff	3
Public buildings and grounds, District of Columbia	1
Post of Fort Leavenworth, First Battalion of Engineers, and engineer officer, Department of the Missouri	1
With Isthmian Canal Commission	2
Survey of Northern and Northwestern lakes	1
Mississippi River Commission, river and harbor works, and light-house district ..	1
Engineer Commissioner, District of Columbia	1
Post of Washington Barracks, Engineer School of Application, and Third Battalion of Engineers	10
River and harbor works and Yellowstone National Park	1
Provisional General Staff and Department of the Columbia	1
United States Military Academy	6
Assistants to Engineer Commissioner, District of Columbia	2
Post of Fort Leavenworth, and First Battalion of Engineers	16
Fortifications, river and harbor works, and engineer officer, Department of Texas ..	1
Fortifications, river and harbor works, and Vicksburg National Military Park ..	1
Buildings for War College, Washington Barracks, and Government Printing Office	2
California Débris Commission	1
Mississippi River Commission	1
The Board of Engineers	1
Adjutant-General's Office, United States Army	1
Graduating leave of absence	10
Total	153

The duties devolving upon the Corps of Engineers have been increasing year by year and are now greater than ever before in its history. These duties now include the command of three battalions of troops; the construction of fortifications; superintending works of river and harbor improvements; the construction and repair of light-houses; the construction of public buildings; the water supply, the municipal engineering, care of public buildings and grounds, and a share in the city government of the capital of the United States; the improvement of the Yellowstone National Park; the survey of the Northern and Northwestern lakes; the mining and debris commission in the State of California, all of which involve the expenditure of many millions annually, and, in addition to various other duties, supervision of military engineering and reconnaissance work in the several military departments and instruction at the Military Academy and schools of application.

The act of February 2, 1901, increased the organization of the Corps of Engineers from 127 officers to 160 and the enlisted strength from one battalion to three battalions. The increase of officers was made up of 5

captains, 10 first lieutenants, and 18 second lieutenants. The extra battalions require the exclusive service of the following officers: Two majors, 8 captains, 12 first lieutenants, and 8 second lieutenants; the net effect of the increase was the loss of 7 officers from the grades which are most effective for duty other than with troops.

While the organization of the Corps of Engineers provides for 160 officers, law, orders, and regulations now provide for not less than 110 positions that must be filled by officers of the Corps of Engineers, independent of duties relating to construction of fortifications and works of river and harbor improvements. A further reduction in number of not less than 16 must be considered for officers sick, on leave, or undergoing instruction at schools of application. As a result there remain but 27 officers specially available for construction work in not less than 54 engineering districts throughout the country.

At the present time it is necessary to so combine works and districts as to throw upon many officers such a number and variety of duties as to make it difficult at times for them to devote to the separate districts and the various items of work the proper detailed consideration.

It is urgently recommended that the number of officers in the Corps of Engineers be increased from 160 to 185, which number, it will be noted from what precedes, is the very least that can properly provide for supervision of the work now assigned by law and regulations.

ENGINEER TROOPS.

The existing law fixing the organization of the Army provides for three battalions of engineers, each made up of four companies.

During the past fiscal year the stations and duties of these battalions and the names of the officers serving therewith were as follows:

FIRST BATTALION OF ENGINEERS.

(Fort Leavenworth, Kans.)

Maj. Smith S. Leach, commanding.

First Lieut. Harry Burgess, adjutant.

First. Lieut. Sherwood A. Cheney, quartermaster and commissary.

COMPANY A.

Capt. Thomas H. Rees.

First Lieut. Frederick W. Altstaetter, until August 3, 1902.

First Lieut. Horton W. Stickley.

Second Lieut. Nathaniel E. Bower.

Second Lieut. Laurence V. Frazier, from October 1, 1902.

COMPANY B.

Capt. George A. Zinn, until February 26, 1903.

Capt. Herbert A. Deakyne, since February 26, 1903.

First Lieut. Francis A. Pope.

Second Lieut. Wildurr Willing.

COMPANY C.

Capt. Clement A. F. Flagler.

First Lieut. George M. Hoffman.

Second Lieut. Robert R. Ralston, since October 1, 1902.

COMPANY D.

Capt. James B. Cavanaugh, until May 25, 1903.
Capt. Robert R. Raymond, since June 14, 1903.
First Lieut. Gilbert A. Youngberg.
Second Lieut. Clarence H. Knight.

During the year the battalion took part in the annual maneuvers at Fort Riley, Kans., where its work received special commendation from the commanding general, Department of the Missouri. It also took part in the ceremonies incident to the dedication of the Louisiana Purchase Exposition at St. Louis. Companies A, B, and C, with ponton-bridge equipage, took part in the rescue and relief of citizens imperiled by the floods on the Missouri River during the spring of 1903.

SECOND BATTALION OF ENGINEERS.

(Philippine Islands.)

Lieut. Col. Clinton B. Sears, commanding, until May 7, 1903.
First Lieut. James A. Woodruff, adjutant.
First Lieut. Edward M. Markham, quartermaster and commissary.
First Lieut. Edward M. Adams, quartermaster and commissary, Companies E and F, since May 28, 1903.

COMPANY E.

Capt. Henry Jerve, detached.
First Lieut. William Kelly, until September 17, 1902.
First Lieut. George B. Pillsbury.
First Lieut. Edward N. Johnston, until October 2, 1902.
First Lieut. George R. Spalding.

COMPANY F.

Capt. Robert McGregor, detached. (Died December 23, 1902.)
First Lieut. Lytle Brown, until September 17, 1902.
First Lieut. Earl I. Brown.
First Lieut. Curtis W. Otwell.
First Lieut. Elliott J. Dent.

COMPANY G.

Capt. Jay J. Morrow, until May 5, 1903.
First Lieut. Amos A. Fries.
First Lieut. Lewis H. Rand, since November 13, 1902.
First Lieut. John R. Slaterry, until September 17, 1902.
First Lieut. Hubert L. Wigmore.
First Lieut. Ernest D. Peek.

COMPANY H.

Capt. William W. Harta.
First Lieut. Lewis H. Rand, until November 13, 1902.
First Lieut. Gustave R. Lukesh.
First Lieut. Clarence O. Sherrill.
Second Lieut. William G. Caples.
Second Lieut. Arthur Williams.
Second Lieut. William A. Mitchell, November 3, 1902, to June 2, 1903.
Second Lieut. Warren T. Hannum, November 3, 1902, to June 2, 1903.

During the year the battalion was engaged in road and bridge work, map making, reconnaissances, and other engineering work usually falling to engineer troops in the field. A detachment from Company G took part in the campaign against the Lake Lanao Moros. On June 14, 1903, Companies G and H sailed for the United States, having been relieved by Companies I and K of the Third Battalion of Engineers.

THIRD BATTALION OF ENGINEERS.

(Washington Barracks, D. C.)

Maj. William M. Black, commanding, until April 1, 1903.

Maj. Edward Burr, commanding, since April 1, 1903.

First Lieut. Frank C. Boggs, adjutant.

First Lieut. William D. Connor, quartermaster and commissary, until September 19, 1902.

First Lieut. Thomas H. Jackson, quartermaster and commissary, since September 20, 1902.

First Lieut. Edward M. Adams, quartermaster and commissary Companies I and K, since May 28, 1903.

COMPANY I.

Capt. Spencer Cosby, since April 2, 1903.

First Lieut. William J. Barden, September 1, 1902, to April 15, 1903.

First Lieut. Thomas H. Jackson, until September 19, 1902.

First Lieut. Edward M. Adams, January 23, 1903, to May 28, 1903.

First Lieut. John R. Slattey, January 7 to April 24, 1903.

First Lieut. Alfred B. Putnam, until April 30, 1903.

First Lieut. Paul Stanley Bond, from November 15, 1902, to January 8, 1903.

First Lieut. John H. Poole.

First Lieut. William A. Mitchell, since June 2, 1903.

COMPANY K.

Capt. Charles Keller, since April 1, 1903.

Capt. Charles W. Kutz, until March 14, 1903.

First Lieut. Albert E. Waldron, until March 24, 1903.

First Lieut. William P. Stokey, since April 11, 1903.

Second Lieut. Henry C. Jewett.

Second Lieut. Mark Brooke, September 30, 1902, to April 7, 1903.

Second Lieut. Warren T. Hannum, since June 2, 1903.

COMPANY L.

Capt. James F. McIndoe.

First Lieut. William Kelly, February 1 to April 24, 1903.

First Lieut. Edmund M. Rhett, until June 4, 1903.

First Lieut. Michael J. McDonough, until April 14, 1903.

First Lieut. Edward N. Johnston, since December 5, 1902.

Second Lieut. William L. Guthrie, since September 29, 1902.

COMPANY M.

Capt. Meriwether L. Walker.

First Lieut. Edward M. Adams, until January 21, 1903.

First Lieut. Albert E. Waldron, since March 25, 1903.

First Lieut. Paul Stanley Bond, since January 8, 1903.

First Lieut. William P. Stokey, until April 11, 1903.

Second Lieut. James F. Bell, since September 30, 1902.

During the year Companies K, L, and M of the Third Battalion took part in the combined Army and Navy maneuvers in the New London, Conn., artillery district, and were commended by the commanding general, Department of the East, for their work, which was entirely satisfactory in every respect. The battalion took part in the ceremonies attendant upon the laying of the corner stone of the building for the Army War College. On April 15, 1903, Companies I and K, under the command of Maj. Curtis McD. Townsend, left Washington Barracks, D. C., for San Francisco, Cal., en route to the Philippine Islands, reaching Manila, P. I., May 27, 1903, where they relieved Companies G and H of the Second Battalion of Engineers.

THE BOARD OF ENGINEERS.

The regulations for the government of the Corps of Engineers provide for a Board of Engineers, consisting of not less than three officers, designated by the Chief of Engineers with the sanction of the Secretary of War. This Board acts in an advisory capacity to the Chief of Engineers upon important questions of engineering. One of its principal duties is to plan or revise the projects for permanent fortifications of the United States.

The composition of this Board and its operations during the past fiscal year are given in its report.

FORTIFICATIONS.

The scheme of national defense upon which work has now been in progress since 1888 is based upon a report dated January 16, 1886, submitted by the Board on Fortifications or other Defenses, popularly known as the Endicott Board. This Board indicated the localities where defenses were most urgently needed, determined the character and general extent of the defenses, with their estimated cost, and recommended for first consideration the names of 27 principal ports, arranged in the order of their importance.

The degree of defense to be provided for coaling and other naval stations scattered all over the world; for the larger naval bases which must be promptly established, and for which appropriations are asked of Congress by the Navy Department; for the ports of Manila, Pearl Harbor, and Honolulu, and for the lake ports and the St. Lawrence River, should preferably be determined by a tribunal similar to the Endicott Board, as recommended in my last annual report. (This tribunal should be created for the purpose by Congress, and, like the Endicott Board, should, it is suggested, include the Secretary of War, the Chiefs of Engineers, Ordnance, and Artillery, one high ranking officer of each of those branches of the service, two naval officers of high rank, and two civilians expert on the subject of our foreign commercial relations.) In the absence of legislation on the subject of insular defenses, a mixed board of engineer and artillery officers, organized by authority of the Secretary of War, has already partially considered and reported upon plans for the emergency defense of several of the most important harbors in the insular possessions. Valuable data have been collected regarding the physical character of the proposed sites, and when money becomes available work of construction can be started with reasonable promptness to provide a defense which will be adequate to emergencies in advance of the adoption of a more complete scheme of defense. Before these preliminary plans are actually entered upon, it might be well to invite the cooperation of the Navy by the assignment of a certain number of naval officers upon a new joint board of army and navy officers appointed to revise or enlarge the preliminary plans of defense heretofore prepared. For this purpose the Board might well assemble and conduct its labors in Washington, where the records are filed and the policy of the Government may be more easily determined.

The first act of Congress designed to carry out the recommendation of the Endicott Board was approved September 22, 1888. It created

the Board of Ordnance and Fortification and made appropriations for beginning the manufacture of modern seacoast ordnance, but made no provision for the construction of batteries. The first appropriation for the construction of gun and mortar batteries was contained in the act of August 18, 1890, since which time appropriations of varying amounts have been made regularly each year for carrying forward the adopted scheme of coast defense, for the manufacture of ordnance, for the construction of batteries, and for torpedo defenses.

From time to time the defensive details for each locality have been carefully elaborated in projects prepared by The Board of Engineers, and in each case these projects have received the formal approval of the Secretary of War prior to the actual beginning of work. Up to the present time projects for permanent seacoast defenses have been adopted for 31 localities in the United States, as follows:

- | | |
|---|--|
| 1. Frenchman Bay, Maine. | 16. Cape Fear River, North Carolina. |
| 2. Penobscot River, Maine. | 17. Charleston, S. C. |
| 3. Kennebec River, Maine. | 18. Port Royal, S. C. |
| 4. Portland, Me. | 19. Savannah, Ga. |
| 5. Portsmouth, N. H. | 20. St. Johns River, Florida. |
| 6. Boston, Mass. | 21. Key West, Fla. |
| 7. New Bedford, Mass. | 22. Tampa Bay, Florida. |
| 8. Narragansett Bay, Rhode Island. | 23. Pensacola, Fla. |
| 9. Eastern entrance to Long Island Sound. | 24. Mobile, Ala. |
| 10. New York, N. Y. | 25. New Orleans, La. |
| 11. Delaware River. | 26. Galveston, Tex. |
| 12. Baltimore, Md. | 27. San Diego, Cal. |
| 13. Washington, D. C. | 28. San Francisco, Cal. |
| 14. Hampton Roads, Virginia. | 29. Columbia River, Oregon and Washington. |
| 15. Entrance to Chesapeake Bay at Cape Henry. | 30. Puget Sound, Washington. |
| | 31. Lake Champlain. |

In addition to the above localities, the defense of the Great Lakes and the St. Lawrence River is under consideration.

Projects for the defenses for San Juan, Porto Rico; Pearl Harbor and Honolulu Harbor, Hawaii; San Luis d'Apra, Guam; Manila Bay, and Subic Bay have been approved by the Secretary of War, and actual construction should begin thereon at an early day. It is believed that the time has come when it will be no longer possible to ignore the question of insular defenses. The Navy Department is properly insistent that all its important coaling stations should receive proper defensive protection to keep off predatory attacks from possible hostile fleets.

The seacoast defenses of the United States are now somewhat more than 50 per cent completed. Twenty-five of the principal harbors of the United States have a sufficient number of heavy guns and mortars mounted to permit an effective defense against naval attack, and during the past three years considerable progress has been made in the installation of an adequate rapid-fire armament, now the matter of first importance.

Gun and mortar batteries.—The existing projects for seacoast defenses comprise 358 heavy guns of 8-inch, 10-inch, and 12-inch calibers, 1,294 rapid-fire guns from 2.24-inch to 6-inch caliber, and 532 mortars. The total cost for the engineering work is estimated at \$50,000,000, including what has been completed as well as what remains to be done.

Since the inauguration of the present system of coast defense the several appropriations made by Congress for the construction of gun and mortar batteries have been as follows:

Act of—	Act of—
August 18, 1890 \$1,221,000.00	May 7, 1898 \$3,000,000.00
February 24, 1891..... 750,000.00	July 7, 1898 2,562,000.00
July 23, 1892..... 500,000.00	March 3, 1899 1,000,000.00
February 18, 1893..... 50,000.00	May 25, 1900 2,000,000.00
August 1, 1894 500,000.00	March 1, 1901 1,615,000.00
March 2, 1895 500,000.00	June 6, 1902 2,000,000.00
June 6, 1896 2,400,000.00	March 3, 1903 2,236,425.00
March 3, 1897..... 3,841,333.00	
Allotments from the appropriation for "National Defense," act of March 9, 1898. 3,817,676.02	Total 27,993,434.02

The total number of seacoast guns and carriages for which the Chief of Ordnance reports his department has made provision, and the corresponding permanent emplacements for which the Engineer Department has made provision with the funds appropriated for construction of gun and mortar batteries, including allotments from the appropriations for "National Defense," are shown in the following table:

Type of gun or carriage.	Total carriages provided.	Total emplacements provided.
12-inch mortar carriages, model 1896	a 306	296
12-inch mortar carriages, model 1891	b 85	80
12-inch disappearing carriages, L. F., model 1901.....	11	11
12-inch disappearing carriages, L. F., model 1897.....	35	85
12-inch disappearing carriages, L. F., model 1896.....	27	27
12-inch gun-lift carriages, altered to nondisappearing.....	8	8
12-inch gun-lift carriages, model 1891.....	2	2
12-inch nondisappearing carriages, model 1892.....	c 28	27
10-inch disappearing carriages, A. R. F., model 1896.....	8	8
10-inch disappearing carriages, L. F., model 1901.....	12	12
10-inch disappearing carriages, L. F., model 1896.....	74	74
10-inch disappearing carriages, L. F., model 1894.....	35	35
10-inch nondisappearing carriages, model 1893.....	d 11	9
8-inch disappearing carriages, L. F., model 1896.....	38	40
8-inch disappearing carriages, L. F., model 1894.....	26	26
8-inch nondisappearing carriages, model 1892.....	e 9	f 9
15-inch smoothbore carriages altered for 8-inch rifles.....	21	g 21
6-inch disappearing carriages, model 1898.....	29	29
6-inch rapid-fire (Vickers Son & Maxim), pedestal mounts.....	8	8
6-inch disappearing carriages, model 1903.....	70	70
6-inch rapid-fire, pedestal mounts, model 1900.....	44	44
5-inch balanced-pillar mounts, model 1896.....	32	32
6-inch pedestal mounts.....	21	21
4.7-inch rapid-fire (Armstrong pattern), pedestal mounts.....	34	34
4.7-inch rapid-fire (Schneider pattern), pedestal mount.....	1	h 1
4-inch rapid-fire (Driggs-Schroeder), pedestal mounts.....	4	4
3-inch balanced-pillar mounts.....	118	118
3-inch casemate mounts.....	2	2
3-inch pedestal mounts.....	184	184
2.24-inch rapid-fire field carriages and rampart mounts.....	70	(i)

a The number of carriages of this type provided for exceeds by 10 the number which the Chief of Engineers has notified the Chief of Ordnance are required for the emplacements he has provided.

b One in use at West Point; 4 in storage.

c One in use at Sandy Hook Proving Ground.

d One at Sandy Hook Proving Ground. The number of carriages of this type provided for exceeds by 2 the number which the Chief of Engineers has notified the Chief of Ordnance are required for the emplacements he has provided.

e One at West Point and 1 at Sandy Hook Proving Ground.

f Five temporary; armament removed from 3.

g Temporary; armament removed from 20.

h Temporary.

i Movable mounts.

The foregoing table shows that up to the present time provision has been made for emplacing 334 heavy guns (including 26 temporary

emplacements), 567 rapid-fire guns (including 1 temporary emplacement), and 376 12-inch mortars.

During the fiscal year just closed operations were carried on with unexpended balances of the appropriations carried by the regular fortification appropriation acts approved May 25, 1900, March 1, 1901, and June 6, 1902. The number of emplacements provided for under each of the foregoing acts is exhibited in previous annual reports. Under the fortification act of March 3, 1903, it is proposed to provide emplacements for the following number of guns:

10-inch.	6-inch.	3-inch.
3	24	60

The total number of emplacements of every kind provided for to date by all appropriations is as follows:

12-inch.	10-inch.	8-inch.	Rapid-fire.	12-inch mortars.
105	133	96	567	376

In this total are included seventy 2.24-inch rapid-fire guns on movable mounts not requiring permanent emplacements, temporary emplacements for twenty-one 8-inch B. L. rifles on modified 15-inch carriages, one temporary emplacement for 4.7-inch rapid-fire gun, and five temporary emplacements for 8-inch guns on nondisappearing carriages. The foregoing temporary emplacements were built during the war with Spain from the "National Defense" funds. The 8-inch guns will be transferred from time to time to permanent emplacements as these are completed, and a number of them have already been so transferred. While it is proposed eventually to disarm these temporary emplacements, they can again be used in case of emergency, and have for this reason been included in the foregoing enumerations.

The status of emplacements for which funds have been provided by Congress is as follows at the close of the fiscal year:

	12-inch.	10-inch.	8-inch.	Rapid-fire.	12-inch mortars.
Guns mounted	92	115	a 93	b 178	328
Ready for armament	9	9	2	c 200	32
Under construction	4	8	1	189	16
Total	105	132	96	567	376

a Twenty-three of these, which have been mounted temporarily, have since been dismantled.

b One temporarily.

c Including seventy 6-pounders not requiring permanent emplacements.

At the close of the previous fiscal year there were reported mounted:

12-inch.	10-inch.	8 inch.	Rapid-fire.	12-inch mortars.
80	112	89	108	297

A comparison of the last two tables shows an addition during the year to the completed seacoast armament of twelve 12-inch guns, three 10-inch guns, four 8-inch guns, seventy rapid-fire guns, and thirty-one mortars.

For continuing the work of construction of gun and mortar batteries in accordance with approved projects an estimate of \$4,250,000 is submitted.

Range and position finders.—During the year satisfactory progress has been made. The utmost harmony has existed between the Chief of Engineers, the Chief of Ordnance, the Chief Signal Officer, and the Chief of Artillery, all of whose departments are involved in the work.

At the present time 11 fire commanders' and 55 battery commanders' stations have been completed and turned over to the troops for use and care; 22 fire commanders' and 55 battery commanders' stations are under construction.

The experimental system of position finding at Pensacola, using long horizontal bases, operated very satisfactorily under actual test. Final action by the Board of Ordnance and Fortification has not yet been taken on the test. An estimate of \$325,000 is submitted to continue the engineer work of installing range finders to serve batteries already built.

Preservation and repair of fortifications.—Operations under this appropriation have been limited during the fiscal year to the preservation of engineer material in new batteries, and to the application of remedial measures for reducing the dampness in some magazines in the earlier works. The mechanical and electrical appliances in modern batteries demand unremitting attention to prevent deterioration and damage under the destructive influence of the moist sea air. The new works already constructed represent an expenditure of approximately \$27,000,000 for engineering work alone. With the \$300,000 provided for by the act of March 3, 1903, for works of preservation and repair it will be possible to remedy many incipient leaks and other defects as well as to remove some faults of construction in the earlier emplacements. It is strongly recommended that an appropriation of the same sum be again made this year, as the needs are great and the number of separate batteries, etc., requiring attention and care is constantly increasing.

Supplies for seacoast defenses.—The acts of May 25, 1900, March 1, 1901, and June 6, 1902, each appropriated the sum of \$25,000, and that of March 3, 1903, \$35,000, for tools and electrical and engine supplies for use of the troops for maintaining and operating light and power plants in gun and mortar batteries. This is designed to enable the Engineer Department to meet the requirements of paragraph 382, Army Regulations, prescribing the articles which are to be supplied by the Engineer Department to the Coast Artillery for the service of the batteries. Requisitions are made directly upon the Chief of Engineers, and authorized articles are purchased and issued by district engineer officers with as little delay as possible. This system has proved satisfactory. An estimate of \$35,000 is submitted for this purpose for the next fiscal year. The sum carried by the last act has proved to be just sufficient for the purpose with the number of plants now in operation.

Sea walls and embankments.—The act of June 6, 1902, appropriated \$100,000 and that of March 3, 1903, \$89,575 for the construction of sea walls and embankments, which has been applied to the construction of sea walls at fortifications for the defense of the eastern entrance to Long Island Sound, New York Harbor, Delaware River, Baltimore, Md., Hampton Roads, Virginia, Tampa, Fla., Pensacola, Fla., Mobile, Ala., New Orleans, La., and San Diego, Cal.

Based upon reports of district engineer officers showing the necessity for their construction, an estimate of \$200,000 is submitted for the construction of sea walls and embankments at a number of additional localities.

Sites.—During the past year negotiations have been continued for the acquisition of one site at Boston Harbor, one at Narragansett Bay, and one at Fort St. Philip, La.; the acquisition of one site at Portland Harbor, Maine, was completed during the year. In addition, negotiations have been entered into for the acquisition of one site at Portland, Me., and one at the eastern entrance to Long Island Sound, and of one tract at Fort Hunt, Va.

A number of sites still remain to be acquired to carry out the approved projects of seacoast defenses, and an estimate of \$2,000,000 is submitted to continue the work. The most important of the sites still to be acquired is the one at the southern entrance to New York Harbor, rendered necessary by the new deep-water entrance now under construction.

Submarine mines.—With few exceptions all harbors are now equipped with torpedo storehouses, cable tanks, and serviceable mining casemates. Many of the latter are not of the latest type and are complained of by the artillery as insufficient in size. As funds become available they will be replaced by more convenient and commodious casemates. Additional mining casemates and storage facilities are still required at several localities; an estimate of \$225,000, to be expended under the Engineer Department, is submitted for their construction. The purchase of torpedo material proper, such as cables, cases, floating plant, etc., was, by act of June 6, 1902, assigned to the Artillery Corps, and the construction of the buildings, casemates, cable galleries, and cable tanks left with the Corps of Engineers.

By the army reorganization act of February 2, 1901, the torpedo defense of the seacoast devolved upon the artillery troops. The material has been reported ready for transfer at all points except Galveston, Tex.

Actual transfers have been made as follows:

Portland, Me., September 30, 1901.	Hampton Roads, Virginia, December 31, 1901.
Portsmouth, N. H., December 16, 1901.	Cape Fear River, North Carolina, November 6, 1901.
Boston, Mass., January 5, 1903.	Charleston, S. C., May 2, 1901.
New Bedford, Mass., November 15, 1901.	Port Royal, S. C., July 26, 1901.
Narragansett Bay, October 31, 1901.	Savannah, Ga., June 29, 1901.
Eastern entrance to Long Island Sound, May 20, 1901.	Key West, Fla., October 15, 1901.
Eastern entrance to New York Harbor, July, 1901.	Tampa, Fla., August 17, 1901.
Southern entrance to New York Harbor, May 6 and 14, 1901.	Pensacola, Fla., May 27, 1901.
Delaware River, July 13, 1901.	Mobile, Ala., June 15, 1901.
Baltimore, Md., April 29, 1901.	New Orleans, La., November 6, 1901.
Washington, D. C., July 24, 1901.	San Diego, Cal., May 31, 1901.
	San Francisco, Cal., April 1, 1903.
	Columbia River, April 30, 1901.

Searchlights and electrical connections.—The fortification appropriation act of March 1, 1901, appropriated \$150,000 for the purchase and installation of searchlights for the defenses of New York Harbor. Under this appropriation work is well advanced. The acts of June 6, 1902, and March 3, 1903, each appropriated \$150,000 for the general installation of searchlights in seacoast defenses.

The construction of the national seacoast defenses has now reached a point where most of the heavy guns are in position, and a large portion of the rapid-fire emplacements and some of the rapid-fire guns are completed, and it is important to continue the systematic installation of searchlight apparatus for night defense. Experience has shown that economy in installation and the keeping of electric plants in good order in time of peace are promoted by habitually using fortification plants for post illumination. An estimate of \$500,000 for searchlight installation is submitted and is recommended for special consideration as one of the urgent needs of the defense at this stage of its progress.

Defenses of insular possessions.—The importance of providing at an early date for the defenses of Porto Rico, the Hawaiian Islands, Guam, and the Philippines has been emphasized by the Chief of Engineers in his annual reports for the past three years, but up to the present time no funds for this purpose have been appropriated. Sufficient data are now on hand to permit beginning the construction of these defenses at once. An estimate of \$2,000,000 for the construction of gun and mortar batteries for the defense of these insular possessions is therefore submitted, to be applied at such insular localities as are now the property of the United States or may become so before the appropriation is exhausted. Sites for this purpose are now available at Porto Rico, Guam, and the Philippines, but the acquisition of additional land will be necessary for the defenses of the Hawaiian Islands. An estimate of \$526,100 is submitted for this purpose.

The following money statements show the actual expenditures during the fiscal year from the various appropriations for fortification work under the Engineer Department and the status, at the close of the fiscal year, of the unexpended balances of allotments:

"GUN AND MORTAR BATTERIES."

For battery construction.

July 1, 1902, balances unexpended	\$1, 775, 966. 48
Net allotments during fiscal year	3, 209, 744. 57
	<hr/>
	4, 985, 711. 05
Expenditures during fiscal year	1, 437, 353. 35
	<hr/>
June 30, 1903, balances unexpended	3, 548, 357. 70
June 30, 1903, outstanding liabilities	\$247, 120. 13
June 30, 1903, covered by uncompleted contracts	210, 377. 37
	<hr/>
	457, 497. 50
	<hr/>
June 30, 1903, balances available	3, 090, 860. 20

For installation of range and position finders.

July 1, 1902, balances unexpended	\$149,590.83
Net allotments during fiscal year	396,016.61
	<hr/>
Expenditures during fiscal year	545,607.44
	201,653.38
	<hr/>
June 30, 1903, balances unexpended	343,954.06
June 30, 1903, outstanding liabilities	\$37,575.20
June 30, 1903, covered by uncompleted contracts	23,185.50
	<hr/>
	60,760.70
	<hr/>
June 30, 1903, balances available	283,193.36

"Searchlights for Harbor Defenses."

July 1, 1902, balances unexpended	30,533.72
Net allotments during fiscal year	217,998.96
	<hr/>
Expenditures during fiscal year	248,532.68
	34,739.81
	<hr/>
June 30, 1903, balances unexpended	213,792.87
June 30, 1903, outstanding liabilities	13,622.18
	<hr/>
June 30, 1903, balances available	200,170.69

"Torpedoes for Harbor Defense."

July 1, 1902, balances unexpended	22,337.43
Net allotments during fiscal year	23,575.00
	<hr/>
Expenditures during fiscal year	45,912.43
	30,312.85
	<hr/>
June 30, 1903, balances unexpended	15,599.58
June 30, 1903, outstanding liabilities	1,378.05
	<hr/>
June 30, 1903, balances available	14,221.53

"Sites for Fortifications and Seacoast Defenses."

July 1, 1902, balances unexpended	72,980.37
Net allotments during fiscal year	73,622.85
	<hr/>
Expenditures during fiscal year	146,603.22
	36,716.75
	<hr/>
June 30, 1903, balances unexpended	109,886.47
June 30, 1903, outstanding liabilities	28,800.00
	<hr/>
June 30, 1903, balances available	81,086.47

"Preservation and Repair of Fortifications."

July 1, 1902, balances unexpended	45,712.89
Net allotments during fiscal year	365,866.54
	<hr/>
Expenditures during fiscal year	411,579.43
	201,711.96
	<hr/>
June 30, 1903, balances unexpended	209,867.47
June 30, 1903, outstanding liabilities	\$15,860.26
June 30, 1903, covered by uncompleted contracts	4,865.00
	<hr/>
	20,725.26
	<hr/>
June 30, 1903, balances available	189,142.21

"Supplies for Seacoast Defenses."

July 1, 1902, balances unexpended.....	\$10,860.05
Net allotments during fiscal year.....	41,272.24
	<hr/>
Expenditures during fiscal year.....	52,132.29
	<hr/>
June 30, 1903, balances unexpended.....	31,871.27
June 30, 1903, outstanding liabilities.....	\$9,120.66
June 30, 1903, covered by uncompleted contracts.....	1,221.00
	<hr/>
	10,341.66
	<hr/>
June 30, 1903, balances available.....	21,529.61

"Sea Walls and Embankments."

July 1, 1902, balances unexpended.....	37,964.86
Net allotments during fiscal year.....	264,673.94
	<hr/>
Expenditures during fiscal year.....	302,638.80
	<hr/>
June 30, 1903, balances unexpended.....	228,779.75
June 30, 1903, outstanding liabilities.....	\$9,696.41
June 30, 1903, covered by uncompleted contracts.....	34,985.82
	<hr/>
	44,682.23
	<hr/>
June 30, 1903, balances available.....	184,097.52

"Building, School of Submarine Defense."

July 1, 1902, balance unexpended.....	11,750.00
Expended during fiscal year.....	11,750.00

"Searchlights for New York Harbor."

July 1, 1902, balance unexpended.....	35,449.03
Expended during fiscal year.....	30,335.92
	<hr/>
June 30, 1903, balance unexpended.....	5,113.11
June 30, 1903, outstanding liabilities.....	16.46
	<hr/>
June 30, 1903, balance available.....	5,096.65

"Board of Ordnance and Fortification."

July 1, 1902, balance unexpended.....	7,829.00
Allotment during fiscal year.....	20,000.00
	<hr/>
Expended during fiscal year.....	27,829.00
	<hr/>
June 30, 1903, balance unexpended and available.....	7,829.00

"Reconstruction and Repair of Fortifications, Galveston, Tex."

July 1, 1902, balance unexpended.....	788,129.02
Expended during fiscal year.....	267,013.07
	<hr/>
June 30, 1903, balance unexpended.....	521,115.95
June 30, 1903, outstanding liabilities.....	\$31,285.04
June 30, 1903, covered by uncompleted contracts.....	155,976.20
	<hr/>
	187,261.24
	<hr/>
June 30, 1903, balance available.....	333,854.71

"Plans for Fortifications."

Allotted during fiscal year.....	5,000.00
Expenditures during fiscal year.....	5,000.00

ESTIMATES OF APPROPRIATIONS REQUIRED FOR 1904-5.

Fortifications.

For gun and mortar batteries:		
For construction of gun and mortar batteries.....	\$4, 250, 000	
For installation of range and position finders.....	325, 000	
		\$4, 575, 000
For sites for fortifications and seacoast defenses.....		2, 000, 000
For searchlights for harbor defenses		500, 000
For protection, preservation, and repair of fortifications.....		300, 000
For preparation of plans for fortifications		5, 000
For supplies for seacoast defenses.....		35, 000
For sea walls and embankments.....		200, 000
For torpedoes for harbor defense		225, 000
For defenses of insular possessions:		
For construction of seacoast batteries	\$2, 000, 000	
For procurement of land for sites for defenses of the Hawaiian Islands	526, 100	
		2, 526, 100
Total.....		10, 366, 100

POST OF WASHINGTON BARRACKS, D. C.

Under the command of Maj. William M. Black, Corps of Engineers, until April 1, 1903, and of Maj. Edward Burr, Corps of Engineers, since that date.

The reservation upon which this post is located is at the southern extremity of the city of Washington, D. C., and upon a long, narrow point lying between the Washington channel of the Potomac River and the James Creek Canal. A concise description of it will be found in the Annual Report, Chief of Engineers, 1902, page 793. The character of the buildings unsuited them for the uses of a garrison and their location was such as to render unavailable much of the area of the post, a large portion of which was subject to overflow at high tides and freshets. During the fiscal year much progress was made in improving the reservation by the reconstruction of sea walls and the raising of low lands by material dredged from the Washington channel. Plans were prepared for the entire reconstruction of the post, and the work was commenced under appropriations specifically made for that purpose. The construction of the War College building, at the southern end of the post, was also commenced.

Pending the completion of new buildings, only such ordinary repairs have been made to old barracks, quarters, and storehouses as to maintain them in fair condition for occupancy.

Water is obtained from the water supply of the city of Washington. The post is lighted by gas. There is no telegraph station upon the post, but telephonic communication is provided with the city. Mails are handled by special messenger to and from the nearest city substation.

There are no target facilities upon the post. A 200-yard range was used for a short time under special authority, but firing upon it had to be discontinued. A 300-yard range was prepared on the reservation of the Fort Foote subpost, and such target firing as could be done on this range and the Ordway rifle range was carried out. The range facilities for this post are entirely inadequate for efficient train-

ing of the troops, and the need of a Government range accessible to all troops near Washington is urgently felt.

The garrison of the post was composed of the Third Battalion of Engineers to April 15, 1903, and of Companies L and M of that battalion after that date. The engineer band was also stationed at the post.

SUBPOST OF FORT FOOTE.

Fort Foote is located on the left bank of the Potomac River about 7 miles below Washington Barracks. A concise description of it will be found in the Annual Report, Chief of Engineers, 1902, page 795. Under authority of the Secretary of War this reservation was placed under the command of the commanding officer of Washington Barracks for purposes of drill and target firing.

Fort Foote does not form a part of the existing project for the defense of the approaches to Washington, and the old defenses are in very bad condition. The existing buildings are old frame structures in bad repair and no garrison is maintained at the post, the reservation being in immediate charge of an ordnance sergeant. It was occupied from time to time during the summer of 1902 and during June, 1903, as a camp site for troops from this garrison while engaged in target firing or engineer drill upon the reservation.

No work was done on the reservation during the year, excepting minor repairs to the wharf, roads, and water supply. Additional repairs will be necessary, particularly to the water supply, in order to place the reservation in the proper condition for the use as a camp site for troops.

THIRD BATTALION OF ENGINEERS.

Under the command of Maj. William M. Black, Corps of Engineers, until April 1, 1903, and of Maj. Edward Burr, Corps of Engineers, since that date.

The Third Battalion of Engineers formed the garrison at Washington Barracks from the beginning of the year until April 15. On that date Companies I and K departed for San Francisco en route to the Philippines, under command of Maj. C. McD. Townsend, Corps of Engineers. Companies L and M are under orders to leave for the same destination on September 15, 1903. Companies K, L, and M were assigned to duty at Forts Wright and Terry during the combined Army and Navy maneuvers in August and September, 1902, and were engaged in operating searchlights and portions of the movable defenses, in addition to some engineering work in connection with the preparation of trenches and siege batteries.

The target firing of the command during the year was not all that could have been desired, due largely to insufficient range facilities, to which reference has been made in the report upon the post of Washington Barracks, D. C. Of the four men sent from the battalion to the department competition two men succeeded in gaining places upon the department team.

The full course of infantry and engineer instruction was carried on throughout the year, being varied to meet the conditions of summer and winter weather, and included many items of practical field instruction as well as theoretical instruction in post and noncommissioned

officers' schools during the winter. A detailed statement of this instruction will be found in the report of the commanding officer of the battalion. The battalion and all of its companies were provided with a full field equipment for service in the Philippines.

ENGINEER SCHOOL OF APPLICATION, U. S. ARMY.

Commandant, Maj. William M. Black, Corps of Engineers, until April 1, 1903, and Maj. Edward Burr, Corps of Engineers, since that date.

The staff of the school is composed of the commandant and 3 instructors detailed for that particular duty. Regular instruction of officers was begun on November 1, 1902, and was continued to April, 1903, when the school, so far as concerns instruction of officers, was suspended by the Secretary of War, on the recommendation of the War College Board and the Chief of Engineers, U. S. Army, these recommendations being based upon the great demand for engineer officers for duty elsewhere and the necessity of vacating the old buildings in order to make room for the new ones in process of erection. During the year 16 officers of the Corps of Engineers were under instruction. A statement of the method of instruction followed will be found in the Annual Report, Chief of Engineers, 1902, and the details of the course during the past year will be found in the report of the commandant. The school is composed of three principal departments for instruction in military engineering, civil engineering, and electrical and mechanical engineering, and the course includes theoretical instruction during the winter season and practical instruction between May 1 and November 1. A trade school is also maintained for the instruction of enlisted men in a number of the mechanical trades.

At the beginning of the fiscal year and following the transfer of the school from Willets Point, N. Y., to this post, the school was lacking in nearly all the items of equipment necessary for successful operation. A large part of the essential elements of equipment for offices, class rooms, laboratories, and shops was provided during the year from the appropriation made for the school. Besides the furniture and supplies needed for office equipment and for maintenance the principal improvements during the year were in the electrical laboratory and the trade-school shops.

In addition to their regular duties much work in other lines was done by the officers on duty with the school, including a consideration of the improvement of the engineer equipment of troops, the improvement of the bridge equipage, and the preparation of the Engineer Field Manual. Four pamphlets, the text of which was prepared by officers on duty with the school, were printed upon the school press and distributed.

ENGINEER DEPOT, WASHINGTON BARRACKS, D. C.

In charge of Maj. William M. Black, Corps of Engineers, until April 1, 1903, and of Maj. Edward Burr, Corps of Engineers, since that date.

The Engineer Depot, located at Washington Barracks, D. C., has been largely employed during the year in the purchase and issue of

equipment for engineer troops, the repair and issue of engineer instruments, the purchase of intrenching tools, and the improvement of the ponton equipage. The routine work of the depot includes, moreover, the care and preservation of a large number of tools and instruments stored at the depot or received and issued from time to time.

The facilities for carrying on the work of the depot at this post have been very meager, particularly in the way of storage facilities. No suitable building for an engineer storehouse has been available since the transfer of this depot from Willets Point, New York Harbor, in October, 1901, and the depot property has been stored in various buildings, which have been temporarily arranged and repaired for the purpose. Many minor repairs and alterations were made to old buildings during the year, but suitable facilities will not be available until the completion of the reconstruction of the post of Washington Barracks. Details of the work of the depot will be found in the report of the officer in charge.

STATEMENT OF FUNDS.

I. For Engineer Depot at Willets Point, N. Y., for fiscal year ending June 30, 1902, for "Washington Barracks:"		
July 1, 1902, balance unexpended.....		\$283. 44
June 30, 1903, expended during fiscal year.....	\$278. 51	
June 30, 1903, turned into the Treasury	4. 93	
		<u>283. 44</u>
II. For Engineer Depot, fiscal year ending June 30, 1903:		
Amount allotted		8, 000. 00
June 30, 1903, expended during fiscal year.....	\$7, 366. 64	
June 30, 1903, amount pledged.....	633. 36	
		<u>8, 000. 00</u>
III. Engineer School, Washington, D. C., 1903:		
Amount appropriated for fiscal year ending June 30, 1903.....		45, 000. 00
June 30, 1903, amount expended during fiscal year.....	\$24, 263. 87	
June 30, 1903, amount pledged.....	20, 486. 12	
June 30, 1903, available for contingent expenses attending the completion of contracts	250. 01	
		<u>45, 000. 00</u>
IV. Equipment of Engineer Troops, fiscal year 1902:		
July 1, 1902, balance unexpended.....		494. 32
June 30, 1903, expended during fiscal year.....	\$372. 50	
June 30, 1903, turned into the Treasury.....	121. 82	
		<u>494. 32</u>
V. Engineer equipment of troops, fiscal year 1903:		
Total of allotments made during fiscal year.....		8, 787. 19
June 30, 1903, expended during fiscal year.....	\$5, 887. 56	
June 30, 1903, amount pledged.....	2, 899. 53	
June 30, 1903, to be turned into the Treasury.....	. 10	
		<u>8, 787. 19</u>
VI. Emergency fund, War Department, act of March 3, 1899, for "Equipment of Electrical Laboratory at Engineer School, Washington Barracks:"		
July 1, 1902, balance unexpended.....		5, 950. 91
June 30, 1903, expended during fiscal year.....	\$4, 939. 99	
July 1, 1903, balance unexpended.....	1, 010. 92	
		<u>5, 950. 91</u>

VII. Examinations, Surveys, and Contingencies of Rivers and Harbors, for

"Repairs of Instruments:"

Amount allotted during fiscal year		\$500.00
June 30, 1903, expended during fiscal year.....	\$491.40	
June 30, 1903, amount pledged.....	8.60	
		<hr/> 500.00

NEW APPROPRIATIONS.

I. For Engineer Depot, for fiscal year ending June 30, 1904, the following amounts were allotted by the Chief of Engineers, United States Army:

a. For "Incidentals"	\$8,000.00	
b. For "Instruments"	500.00	
		<hr/> \$8,500.00

For Engineer Equipment of Troops, for fiscal year ending June 30, 1904

5,400.00

II. For Engineer School, Washington, D. C., for fiscal year ending June 30, 1904:

Amount appropriated for equipment and maintenance of the Engineer School of Application at Washington Barracks, D. C. 25,000.00

ENGINEER DEPOT, FORT LEAVENWORTH, KANS.

This depot is maintained for the purpose of storing and issuing supplies for the First Battalion of Engineers, and for the storage of the surplus ponton materials. It is under the charge of Maj. Smith S. Leach, Corps of Engineers, commanding First Battalion of Engineers.

During the year additional ponton material has been purchased, and repairs have been made to that on hand.

The reproduction of plates in connection with the Engineer Field Manual has also been in progress.

The additional operations of the depot have consisted in the purchase of photographic and drafting supplies, tools and supplies for the First Battalion of Engineers, and equipment for the engineer shop of instruction.

Details of expenditures are shown in the report of the officer in charge.

ENGINEER DEPOT, NEW YORK CITY.

Officer in charge during the fiscal year, Lieut. Edward H. Schulz, Corps of Engineers.

The Engineer Depot at Willets Point, N. Y., was closed on June 30, 1902, and transferred to Army Building, New York City. All property was disposed of by transfer and condemnation. Final return for the Willets Point Depot was rendered December 31, 1902.

During the year purchases of engineering supplies of all kinds were made for the engineer equipment of troops; and instruments were purchased and repaired for use of engineer officers in charge of districts and department and division engineers.

Such purchases of submarine mining material as were authorized by the Chief of Engineers were made. On February 21, 1903, in accordance with instructions received from the Chief of Engineers, the unexpended balance of funds on account of allotments from appropriation "Torpedoes for Harbor Defense," for purchase of submarine mining materials, etc., was deposited to the credit of the appropriation.

On December 11, 1902, a test of the Engelhardt collapsible lifeboat was witnessed at the New York Navy-Yard, and report submitted thereon to the Chief of Engineers on December 19, 1902.

Six sketching cases were manufactured on the Bower plans and specifications, and two issued to each of the three battalions of engineers for test.

Six sketching boards were manufactured on the McGregor-Harts plans and specifications, and two issued to each of the three battalions of engineers for test.

The total number of instruments repaired and average cost of same were as follows:

	Number.	Total cost.	Average cost.
Transits	78	\$3, 280. 85	\$41. 81
Levels	53	1, 132. 15	21. 26
Sextants	15	438. 15	29. 21
Miscellaneous instruments	91	1, 044. 80	11. 48
Total	237	5, 875. 95	.....

Engineering and surveying supplies purchased and shipped during the fiscal year:

United States:	
Engineer officers of departments	\$2, 136. 72
Post engineer officers	1, 266. 79
Engineer officers of districts	46. 20
First Battalion of Engineers	741. 18
Third Battalion of Engineers	101. 33
Engineer Depot, Washington Barracks, D. C.	1, 008. 60
State militia	46. 82
Balance of United States	589. 07
Alaska	14. 72
Cuba	19. 35
Porto Rico	12. 00
Philippine Islands (including Second Battalion of Engineers)	3, 292. 87
China	10. 95
Total	9, 286. 60

I. Torpedoes for Harbor Defense, act March 1, 1901, for "Purchase of Submarine Mining Materials, etc.:"

July 1, 1902, balance unexpended	2, 075. 39
June 30, 1903, amount expended during fiscal year	\$671. 33
February 21, 1903, amount deposited to credit of Treasurer United States	1, 404. 06
	2, 075. 39

II. Engineer Equipment of Troops, 1903, act June 30, 1902:

June 30, 1903, total of allotments received	10, 323. 05
June 30, 1903, amount expended during fiscal year	10, 323. 05

III. Engineer Equipment of Troops, 1903, act June 30, 1902, "Purchase and Repair of Instruments:"

November 7, 1902, amount allotted	625. 00
June 30, 1903, amount expended during fiscal year	625. 00

IV. Engineer Depot, 1903:

1. Act June 30, 1902, for "Instruments"—	
July 10, 1902, amount allotted	2, 500. 00
June 30, 1903, amount expended during fiscal year	2, 500. 00
2. For "Incidentals"—	
December 4, 1902, amount allotted	416. 69
June 30, 1903, amount expended during fiscal year	416. 69

V. Examinations, Surveys, and Contingencies of Rivers and Harbors, "Purchase and Repair of Instruments:"	
June 30, 1903, total of allotments received.....	\$1,750.00
June 30, 1903, amount expended during fiscal year.....	1,301.98
July 1, 1903, balance available	448.02
VI. Gun and Mortar Batteries, act of June 6, 1902. "Purchase and repair of instruments:"	
June 30, 1903, total of allotments received.....	\$1,125.00
June 30, 1903, amount expended during fiscal year	618.73
July 1, 1903, balance available	508.27

ESTIMATES OF APPROPRIATIONS REQUIRED FOR THE ENGINEER DEPOTS FOR 1904-5.

For incidental expenses of the depots, including fuel, lights, chemicals, stationery, hardware, machinery, pay of civilian clerks, mechanics, and laborers, extra-duty pay to soldiers necessarily employed for periods not less than ten days as artificers on work in addition to and not strictly in the line of their military duties, such as carpenters, blacksmiths, drafts- men, printers, lithographers, photographers, engine drivers, telegraph operators, teamsters, wheelwrights, masons, machinists, painters, over- seers, and laborers; repairs of and for materials to repair public build- ings and machinery, and for unforeseen expenses.....		\$11,500
For purchase and repair of instruments to be issued to officers of the Corps of Engineers and to officers detailed and on duty as acting engineer offi- cers, for use on public works and surveys		5,000
Total		16,500

ENGINEER EQUIPMENT OF TROOPS AND CIVILIAN ASSISTANTS TO ENGINEER OFFICERS.

By act of Congress approved June 30, 1902, the sum of \$25,000 was appropriated for the equipment of engineer troops in the field, for the procurement of ponton trains, intrenching tools, instruments, drawing materials, etc., and the sum of \$25,000 for civilian assistants to engineer officers serving on the staffs of division, corps, and department commanders to enable them to secure the employment of surveyors, draftsmen, photographers, master laborers, and clerks. Both appropriations were limited to the fiscal year 1903.

With the funds appropriated for the purposes above stated engineering supplies were furnished mainly through the United States engineer depots for the various military departments in the United States, the Philippines, and Porto Rico, and the several engineer officers attached to important military commands and departments have been supplied with the necessary civilian assistants. Under the act \$24,999.90 was allotted from the equipment appropriation, and a balance of 10 cents reverted to the Treasury. From the appropriation for civilian assistants \$21,428.46 was allotted, and a balance of \$3,571.54 reverted to the Treasury.

The army appropriation act of March 2, 1903, provided \$25,000 for the engineer equipment of troops and \$25,000 for civilian assistants to engineer officers for the fiscal year ending June 30, 1904.

The engineer troops are now practically provided with their own ponton equipment. The sum of \$75,000 is estimated as required for the engineer equipment of troops for the next fiscal year. With this

amount, if appropriated, it is designed to repair and maintain the existing ponton equipment and to procure one ponton train, consisting of four divisions, at an estimated cost of \$50,000, as a reserve for volunteer engineer troops in time of war and for maneuvers.

The sum of \$25,000 is requested for civilian assistants to engineer officers for the next fiscal year.

For details of expenditures under these appropriations see Appendixes Nos. 2, 3, 4, and H H H.

SERVICE OF OFFICERS OF THE CORPS OF ENGINEERS
ABROAD AND IN THE FIELD, WITH TROOPS, JULY 1,
1902, TO JUNE 30, 1903.

LIEUT. COL. CHARLES E. L. B. DAVIS.

July 1, 1902, to June 30, 1903.—Engineer officer, Division of the Philippines. Senior member of Board of officers to consider and report upon the subject of the defense of the important harbors of the Philippine Islands.

October 15, 1902.—President of Board of officers for the examination for promotion of certain officers of the Corps of Engineers.

December 29, 1902.—Member of Board of officers to investigate the circumstances of the grounding of the transport *Sherman* in San Fernandino Straits on December 26, 1902, and to fix the responsibility therefor.

LIEUT. COL. CLINTON B. SEARS.

July 1, 1902, to May 7, 1903.—Commanding Second Battalion of Engineers. Disbursing officer for the office of the engineer officer, Division of the Philippines. In charge of the improvement of the harbor of Manila and the Pasig River.

October 15, 1902.—Member of Board of officers for the examination for promotion of certain officers of the Corps of Engineers.

November, 1902.—Member of committee to prepare plan and estimate for demolition of part of the old Spanish enciente, parallel to and adjoining the south bank of the Pasig River, and the protection of the ground thus acquired by a sea wall.

December, 1902.—In consultation with the civil governor as to an additional breakwater for Manila Harbor and the necessity of establishing harbor lines in the Pasig River.

January 3, 1903.—Member of Board of survey to make inventory and return for property for which Capt. Robert McGregor, Corps of Engineers, was responsible at the time of his death.

January 9, 1903.—Ex officio member of commission to establish harbor lines in the port of Manila and the Pasig River.

May 7, 1903.—Relieved from duty in the Division of the Philippines and left Manila on board transport *Sheridan* for Japan, on leave of absence.

MAJ. CURTIS M'D. TOWNSEND.

May 27, 1903.—Arrived at Manila, P. I., on transport *Thomas*, in command of Companies I and K, Third Battalion of Engineers, and assumed command of Companies E and F, Second Battalion of Engineers.

May 28, 1903.—Assigned to the charge of the harbor improvements of the port of Manila and of the Pasig River, and as disbursing officer, office of the engineer officer, Division of the Philippines.

June 15, 1903.—Member of Board of officers for the examination for promotion of certain officers of the Corps of Engineers.

CAPT. HENRY JERVEY.

July 1, 1902, to June 30, 1903.—Light-house engineer Philippine Archipelago. Assistant to the engineer officer, Division of the Philippines. Member of Board of officers to consider and report upon the subject of the defense of the important harbors of the Philippine Islands. Member of committee to make inventory of Government property in the province of Cavite.

October 15, 1902.—Member of Board of officers for the examination for promotion of certain officers of the Corps of Engineers.

May, 1903.—In charge of the construction of a 1,400-ton marine railway, under the direction of the chief of the bureau of coast guard and transportation.

CAPT. WILLIAM W. HARTS.

July 1, 1902.—Commanding Company H, Second Battalion of Engineers; commanding engineer garrison of Manila; member of Board of officers to determine the project for the establishment of a new post near Manila (Fort William McKinley), and in charge of preliminary work of construction at the post.

July 1 to September 30, 1902.—Engineer officer on the staff of the commanding general Department of North Philippines.

July 21 to September 2, 1902.—On leave of absence in Japan.

September 6 to December 30, 1902.—Commanding garrison of Cuartel de Malate.

September 30, 1902, to June 3, 1903.—Engineer officer on the staff of the commanding general Department of Luzon.

October, 1902.—Member of Board of officers for the establishment of a post and prison at Malahi Island.

October 10, 1902.—Member of Boards of officers for the establishment of new posts at Corregidor Island and at Mariveles, Bataan Province.

January 20, 1903.—In charge of survey of post site at Bayambang, Pangasinan Province.

February, 1903.—In charge of survey of military lands within the limits of Manila, under orders of the division commander.

March 5, 1903.—Member of Board of officers for the examination for promotion of certain officers of the Signal Corps.

April, 1903.—In charge of preliminary work on construction of new post at Los Banos.

May 7-28, 1903.—Commanding Second Battalion of Engineers.

June 14, 1903.—Sailed from Manila on board transport *Thomas* in command of Companies G and H, Second Battalion of Engineers.

CAPT. ROBERT M'GREGOR.

July 1, to December 23, 1902.—Sanitary engineer for the Philippine Islands and engineer of the city of Manila.

November, 1902.—Member of committee to prepare plan and estimate for the demolition of part of the old Spanish enciente, parallel to and adjoining the south bank of the Pasig River, and the protection of the ground thus acquired by a sea wall.

December 23, 1902.—Died at Manila, Philippine Islands.

CAPT. CHARLES KELLER.

May 27, 1903.—Arrived in Manila, P. I., on transport *Thomas*, commanding Company I, Third Battalion of Engineers.

May 29, 1903.—Member of Board of officers to examine into, report upon, and fix responsibility for the grounding of United States army transport *Seward* off the northwest coast of island of Panay on the night of April 24, 1903.

June 6, 1903.—Member of Board of officers to examine and report upon the collision of a casco with pier of Alaya Bridge on October 13, 1902, and to estimate damage to bridge.

June 11, 1903.—Engineer officer, Department of Mindanao.

CAPT. SPENCER COSBY.

May 27, 1903.—Arrived in Manila, P. I., on transport *Thomas*, commanding Company I, Third Battalion of Engineers.

June 3, 1903.—Engineer officer department of Luzon.

June 3, 1903.—Member of Board of officers to consider and determine project for the establishment of military post near Manila (Fort William McKinley), vice Captain Harts, relieved.

June 8, 1903.—Turned over to the treasurer of the Philippine Islands the new Philippine coinage received from the superintendent of the United States mint at San Francisco, Cal. Member of Board of officers to investigate and report upon the claim of Felipe Zamora for rent and alleged damages to property occupied by the Government and claimed by him.

CAPT. JAY J. MORROW.

July 1, 1902.—Commanding Company G, Third Battalion of Engineers.

July 1 to September 30, 1902.—Engineer officer Seventh Separate Brigade.

October 1, 1902, to June 3, 1903.—Engineer officer Department of Mindanao. Assistant quartermaster, United States Army, in connection with construction of Iligan Lanao road. In charge of construction of roads near Malabang and from Cottabato to Davas. In charge of construction and repair of wharf at Iligan and of wharves at Jolo and Parang. In charge of installation of anchorage appliances for Zamboanga wharf.

October to November 26, 1902.—Engineer officer expedition against the Lake Lanao Moros.

LIEUT. LYTLE BROWN.

July 1, 1902.—Attached to Company F, Second Battalion of Engineers.

July 1 to October 14, 1902.—In charge of survey and of preparation of project for improvement of Cagayan River, Luzon.

September 17, 1902.—Relieved from duty in the Division of the Philippines and ordered to proceed to Washington, D. C., and report to the Chief of Engineers for orders.

October 31, 1902.—Sailed from Manila on board transport *Crook*.

LIEUT. EARL I. BROWN.

July 1 to October 8, 1902.—In command of Company F, Second Battalion of Engineers.

July 1 to September 30, 1902.—Assistant engineer officer, Department of South Philippines.

September 25 to October 4, 1902.—On detached service at Camp Vicars.

September 25–26, 1902.—Engineer officer on expedition against hostile Moros near Lake Butig, south of Lake Lanao.

October 19, 1902.—Engineer officer, Department of the Visayas. In charge of the property and records of the office of the engineer officer, Department of South Philippines.

November 25, 1902.—Assumed command of Company F, Second Battalion of Engineers, at Iloilo, Department of the Visayas.

January, 1903.—In charge of survey of Iloilo Harbor with a view to making plans and estimates for the improvement thereof, and in charge of building roads and bridges on the island of Panay.

February, 1903.—Directing certain road work on the islands of Guimaras and Panay, making surveys of the proposed sites for military posts at Camp Jossman, Guimaras, and at Ormac, Leyte, and making maps of the department.

May, 1903.—Member of Board of officers to visit, report upon, and assist in all construction work in connection with establishment of army posts throughout the Department of the Visayas.

LIEUT. AMOS A. FRIES.

July 1 to December 6, 1902.—In command of a detachment of 45 men of Company G, Second Battalion of Engineers, building a wharf at Zamboanga, and discharge of engineer office Seventh Separate Brigade in the absence of Capt. Jay J. Morrow, Corps of Engineers.

September 10–29, 1902.—On duty in the field in the vicinity of Camp Vicars making a map of Lake Lanao, Mindanao, and on one expedition lasting five days against the Lake Lanao Moros as engineer officer of the expedition.

December 6, 1902, to March 4, 1903.—Constructing wharf at Jolo, Jolo, P. I., preparing plans for wharf at Siasi, Siasi, P. I., and investigating with view to improvement of water supply of Jolo, Jolo.

March 12 to April 25, 1903.—Sick in First Reserve hospital, Manila.

April 26 to May 18, 1903.—On temporary duty with Company H, Second Battalion of Engineers.

May 19, 1903.—Commanding Company G, Second Battalion of Engineers.

May 28–30, 1903.—On temporary special duty making an accurate survey of Mariveles quarantine station, Mariveles, Bataan, Luzon, P. I.

June 14, 1903.—Sailed from Manila on transport *Thomas* with Company G, Second Battalion of Engineers.

LIEUT. JAMES A. WOODRUFF.

July 1, 1902.—Adjutant Second Battalion of Engineers, ordnance, signal, and recruiting officer, and acting quartermaster and commissary of the Second Battalion of Engineers and the engineer garrison, post of Manila. Adjutant and summary court officer of the engineer garrison until July 19, 1902. In charge of the photographic laboratory of the office of the engineer officer of the Division of the Philippines. In charge of the instruction of Companies E and H, Second Battalion of Engineers, in photography.

July 1 to September 6, 1902.—Commanding engineer garrison of Manila.

July 19–31, 1902.—Acting engineer officer, Department of North Philippines.

July 31 to August 8, and August 22 to September 6, 1902.—In charge of the engineer office, Department of North Philippines.

November 7 to December 2, 1902.—With a detachment of 6 enlisted men engaged in making survey of site of new post at Laguan, Samar, and the preparation of plans and estimates for a wharf at the same place.

December 2, 1902.—Adjutant engineer garrison of Manila.

December 2–31, 1902.—Adjutant Cuartel de Malate.

December, 1902, to January 15, 1903.—Instructor of field engineering and military topography and sketching, officers' school, Cuartel de Malate.

January 7–13, 1903.—Member of party sent on transport *Ingalls* to locate rock on which transport *Sherman* struck in San Bernardino Straits on December 26, 1902.

March 14 to April 2, 1903.—Engaged in the exploration of the Mariveles Military Reservation with a view to the selection of a suitable site for a hospital and recuperation post above the 2,500-foot level, and also the location of a practicable wagon road to the site.

May 30, 1903.—Relieved of all duties except adjutant, Second Battalion of Engineers, by Lieutenant Adams.

June 14, 1903.—Sailed from Manila on transport *Thomas*, with Companies G and H, Second Battalion of Engineers.

LIEUT. WILLIAM KELLY.

July 1, 1902.—Ordered to proceed to Iloilo, Panay, P. I., to assume charge of the survey, project, and estimate for the improvement of Iloilo Harbor.

July 18, 1902.—At Iloilo, Panay.

July 29, 1902.—Engineer officer Fifth Separate Brigade.

September 17, 1902.—Relieved from duty in the Division of the Philippines.

September 24, 1902.—Left Iloilo.

October 1 to November 30, 1902.—En route from Manila, P. I., to New York City on board the transport *McClellan*, via Suez Canal.

LIEUT. LEWIS H. RAND.

July 1, 1902.—On duty with Company H, Second Battalion of Engineers. Engaged on road and bridge work near Dagupan, Pangasinan.

July 31, 1902.—Abolished office at Dagupan, work having been completed, and changed station to Malate, Manila, P. I.

August 1-22, 1902.—Commanding Company H, Second Battalion of Engineers.

August 9 to September 9, 1902.—Acting engineer officer, Department of North Philippines.

August 22 to November 26, 1902.—Engaged on preliminary survey of sites for contemplated new stations at Arayat and Angeles, Panganga, Luzon, P. I.

December 8, 1902.—Transferred to Company G, Second Battalion of Engineers, and assumed command at Iligan, Mindanao.

May 18, 1903.—Brought Company G to Manila and transferred to Company H, Second Battalion of Engineers.

June 4, 1903.—Temporarily relieved from duty with Company H and attached to Company F, Second Battalion of Engineers.

LIEUT. EDWARD M. MARKHAM.

July 1, 1902.—Quartermaster and commissary, Second Battalion of Engineers.

July 1, 1902, to April 13, 1903.—In local charge of preliminary work of construction of Fort William McKinley.

April 13 to May 4, 1903.—Investigating titles to certain coal lands in island of Batan and securing options for their purchase by the United States from the claimants.

May 28, 1903.—Relieved from duty as quartermaster and commissary, Second Battalion of Engineers, by Lieutenant Adams.

June 14, 1903.—Sailed from Manila, on transport *Thomas*, with Companies G and H, Second Battalion of Engineers.

LIEUT. GEORGE B. PILLSBURY.

July 1, 1902, to January 31, 1903.—In charge of the engineer work in the Third Brigade, Division of the Philippines, including the construction of a road from Calamba to Batangas and of road from Bay to San Pablo, and surveys and estimates of proposed sites for military posts at Calamba, Los Banos, Santo Tomas and Batangas.

February 10, 1903.—On special duty under the chief engineer, Division of the Philippines, measuring and marking areas for the batteries, their garrisons, and water supply on the north and south shores of the entrance to Manila Bay.

May 7, 1903.—Rejoined Company E, Second Battalion of Engineers, and left Manila with company.

May 12, 1903.—Arrived at Iligan, Mindanao.

May 13, 1903.—Relieved Lieutenant Rand of the charge of the Iligan-Lake Lanao military road.

May 17, 1903.—The company marched to Camp Pantar, at the head of the work on the road. Engaged in supervising the engineer work on the road and the construction of the suspension bridge over the Argus River.

LIEUT. EDWARD M. ADAMS.

May 27, 1903.—Arrived at Manila, P. I., on transport *Thomas*, acting adjutant, quartermaster, and commissary, Companies I and K, Third Battalion of Engineers.

May 28, 1903.—Quartermaster and commissary, Companies E and F, Second Battalion of Engineers, and Companies I and K, Third Battalion of Engineers.

May 30, 1903.—Adjutant, ordnance, signal, recruiting, intelligence, and summary court officer, engineer garrison of Manila.

June 6, 1903.—Quartermaster and commissary of the engineer garrison of Manila.

LIEUT. GUSTAVE R. LUKESH.

July 1 to December 8, 1902.—In charge of road and bridge work in provinces of Cagayan, Isabela, and Nueva Viscaya. Commanding detachment of Company E, Second Battalion of Engineers.

December 9-16, 1902.—En route to Manila.

December 17, 1902.—Reported at Cuartel de Malate and assigned to temporary command of Company E, Second Battalion of Engineers. Commanding Company E until April 7, 1903.

January 7-14 and March 14 to April 2, 1903.—Adjutant and summary court officer of engineer garrison, acting adjutant, ordnance, signal, and recruiting officer, acting quartermaster and commissary, Second Battalion of Engineers, and in charge of the photographic laboratory of the office of the engineer officer of the Division of the Philippines.

February 1 to April 11, 1903.—Engaged on survey of military lands in Manila.

April 8, 1903.—In local charge of the preliminary work of construction of Fort William McKinley. Engaged in the construction of roads, grading sites for barracks, supervision of the drilling by contract of artesian wells, and of construction by contract of eight infantry barracks.

June 14, 1903.—Sailed from Manila on transport *Thomas* en route for the United States.

LIEUT. JOHN R. SLATTERY.

July 1-9, 1902.—At Manila, P. I., in charge of repairs to roads in the vicinity of Manila, P. I.

July 9 to September 17, 1902.—In command of Company E, Second Battalion of Engineers.

July 19 to September 2, 1902.—Summary court officer, engineer garrison of Manila, during absence of Captain Harts.

July to September, 1902.—In charge of a survey of the military lands in Manila and of road work near Pasay.

September 17, 1902.—Relieved from duty in the Division of the Philippines.

October 1, 1902.—Sailed from Manila on transport *McClellan* for New York City via the Suez Canal.

LIEUT. CURTIS W. OTWELL.

July 1, 1902, to June 30, 1903.—Attached to Company F, Second Battalion of Engineers. Engaged in preparing project, plans, and estimates and in construction of pier at Calbayog, Samar, P. I.

LIEUT. HUBERT L. WIGMORE.

July 1 to August 5, 1902.—Attached to Company G, Second Battalion of Engineers. Sick in hospital at Zamboanga.

August 5 to September 30, 1902.—Aid-de-camp on the staff of the commanding general, Department of North Philippines.

September 30, 1902.—Aid-de-camp on the personal staff of the commanding general, Division of the Philippines.

December 29, 1902.—Recorder of Board of officers to investigate the circumstances attending the grounding of the transport *Sherman* in San Bernardino Straits on December 26, 1902, and to fix the responsibility therefor.

February 11 to June 19, 1903.—In charge of clerks and messengers and in command of detachment of enlisted men at headquarters, Division of the Philippines.

February 11 to June 19, 1903.—Recorder of Board of officers to consider and determine the project, in all its details, of the establishment of a military post near the city of Manila.

June 19, 1903.—Detailed on special duty in the Quartermaster's Department and assigned to the work of developing and working the Government coal deposits on Batan Island, province of Albay.

LIEUT. WILLIAM P. STOKEY.

May 27, 1903.—Arrived at Manila, P. I., on transport *Thomas*, with Company I, Third Battalion of Engineers.

June 15, 1903.—On duty in connection with certain surveys under the direction of the commanding general Third-Brigade.

LIEUT. EDWARD N. JOHNSTON.

July 2-25, 1902.—Sick in quarters.

July 26 to August 10, 1902.—Sick in First Reserve hospital.

August 11 to September 12, 1902.—Sick in quarters.

September 13-20, 1902.—On duty with Company E, Second Battalion of Engineers.

September 21-30, 1902.—Sick in First Reserve hospital.

October 1-31, 1902.—En route from Manila to San Francisco, Cal., on transport *Sheridan*.

LIEUT. CLARENCE O. SHERRILL.

July 1-6, 1902.—In charge of road and bridge work at San Fernando, Pampanga, in command of detachment of engineer troops.

July 7-20, 1902.—At Manila, P. I., commanding Company H, Second Battalion of Engineers.

July 21 to August 23, 1902.—On duty with Company H, Second Battalion of Engineers.

August 23 to October 11, 1902.—At Bayambang, Pangasinan, surveying regimental post.

October 20-25, 1902.—At Mariveles, Bulacan, surveying two-company post.

November 1 to December 19, 1902.—Commanding Company E, Second Battalion of Engineers.

November 7 to December 2, 1902.—Acting adjutant Second Battalion of Engineers, adjutant Cuartel de Malate, summary court officer, adjutant of engineer garrison of Manila.

January 5-31, 1903.—Sick in hospital, Manila.

February 4 to May 15, 1903.—In charge of wharf construction at new military post near Iligan, Mindanao, and of truss bridge across Nanucan River.

May 15-18, 1903.—On duty with Company G, Second Battalion of Engineers.

May 18, 1903.—On duty with Company H, Second Battalion of Engineers.

LIEUT. JOHN H. POOLE.

May 27, 1903.—Arrived at Manila, P. I., on transport *Thomas*, with Company I, Third Battalion of Engineers.

May 27, 1903.—Assigned to special duty in the office of the adjutant-general, Division of the Philippines.

June 19, 1903.—Assigned to command of detachment of enlisted men at headquarters, Division of the Philippines.

June 19, 1903.—Recorder of Board of officers to consider and determine the project, in all its details, for the establishment of a military post near the city of Manila.

LIEUT. ERNEST D. PEEK.

July 1, 1902.—On duty with Company G, Second Battalion of Engineers, at Parang, Mindanao, P. I., engaged in the construction of the Parang-Cottabato road.

August 22 to September 3, 1902.—Constructing road from Malabang to Lake Lanao.

November 1-13, 1902.—Engaged on survey of military reservation at Malabang, Mindanao.

November 1-30, 1902.—Making map of Parang Bay and plan for wharf. Constructing wharf at Parang and a telegraph line from Parang to Cottabato.

April 5-19, 1903.—Engineer officer, Bacalod expedition, under the command of Capt. John J. Pershing, Fifteenth Cavalry, U. S. Army.

April 20 to May 25, 1903.—On duty at Parang, engaged on road construction from Parang to Cottabato and in building wharf at Parang.

May 26 to June 12, 1903.—On duty at Zamboanga, turning over property to Capt. Jay J. Morrow, Corps of Engineers.

June 12-15, 1903.—En route to Manila.

June 15, 1903.—Reported to the commanding officer, post of Manila.

June 17, 1903.—Reported to the commanding officer, Company I, Third Battalion of Engineers.

June 24, 1903.—Relieved from duty with Company I, Third Battalion of Engineers.

June 26, 1903.—Boarded the transport *Kilpatrick* under orders to proceed to New York City, via the Suez Canal.

LIEUT. GEORGE R. SPALDING.

July 1-9, 1902.—In charge of road and bridge work in the provinces of Nueva Ecija and Tarlac, Luzon.

July 2 to September 6, 1902.—On duty with Company E, Second Battalion of Engineers.

July 19 to September 6, 1902.—Adjutant of engineer garrison of Manila during absence on leave of Captain Harts.

August 23 to September 6, 1902.—Commanding Company H, Second Battalion of Engineers, during absence of Lieutenant Rand.

September 18 to October 26, 1902.—Commanding Company E, Second Battalion of Engineers.

October 26 to November 7, 1902.—Engaged in survey of military reservation at Santa Cruz, Cavite.

November 11, 1902.—Survey of military post on island of Guimaras.

January 14, 1903.—In charge of road construction on Guimaras Island.

March 14, 1903.—In charge of wharf construction at Buena Vista.

LIEUT. ELLIOTT J. DENT.

July 1, 1902.—On duty with Company F, Second Battalion of Engineers, in the field near Malabang, Mindanao, P. I.

October 9 to November 25, 1902.—In charge of the completion of the road from Mataling Falls to Camp Vicars and the maintenance of the road from Malabang to Camp Vicars.

November 26, 1902, to January 31, 1903.—Sick in Base hospital, Iloilo, Panay, P. I.

February 1, 1903.—In charge of construction of military road from Camp Jossman to Buena Vista and of a riprap pier at Buena Vista.

May 12, 1903.—At Camp Jossman, Guimaras Island, in charge of road work on the Buena Vista-Supon road; of the survey of the reservation of Camp Jossman, and of the construction of wharf at Buena Vista.

LIEUT. WILLIAM G. CAPLES.

July 1, 1902, to February 1, 1903.—On duty with Company H, Second Battalion of Engineers, and in charge of road and bridge work in Batangas and Laguna provinces, P. I.

February 1 to May 31, 1903.—In charge of engineering work in Laguna, Tayabas, and Batangas provinces; in charge of construction of the Calamba-Batangas road and the Bay-San Pablo road; assisting in the surveys of military posts; directing the laying out of post at Batangas, P. I., and mapping unmapped portions of Batangas Province, P. I.

June 8, 1903.—Attached to the casual detachment on board the transport *Thomas*.

June 14, 1903.—Sailed from Manila on the transport *Thomas* with Companies G and H, Second Battalion of Engineers.

LIEUT. HENRY C. JEWETT.

May 27, 1903.—Arrived at Manila, P. I., on the transport *Thomas*, with Company K, Third Battalion of Engineers.

May 29, 1903.—Charged with the survey of military reservation and erection of barracks at Baguio, province of Benguet, Luzon.

June 5, 1903.—Arrived at Baguio.

LIEUT. ARTHUR WILLIAMS.

July 1 to September 30, 1902.—On temporary duty in the office of the engineer officer, Division of the Philippines. Assistant to the Board of officers to consider and report upon the subject of the defense of the important harbors of the Philippine Islands.

October 1, 1902, to January 8, 1903.—On duty with Company H, Second Battalion of Engineers.

November 7–21, 1902.—Sick in First Reserve hospital at Cuartel de Malate, Manila.

January 7, 1903.—Transferred to Company F, Second Battalion of Engineers.

January 9–23, 1903.—Awaiting transportation and en route to join Company F, Second Battalion of Engineers.

February 1–5, 1903.—In charge of survey of part of Guimaras Island.

February 5–15, 1903.—Sick in Base hospital, Iloilo, Panay.

February 15 to March 12, 1903.—In charge of Buena Vista-Santa Rosario road on Guimaras Island. Member of Board of officers to consider and report upon the boundaries of post, titles to land, etc.

March 16, 1903.—Sick in First Reserve hospital, Manila.

May 19, 1903.—Ordered for duty with Company G, Second Battalion of Engineers.

June 8, 1903.—Attached to the Casual Detachment on board the transport *Thomas*.

June 14, 1903.—Sailed from Manila on the transport *Thomas*, with Companies G and H, Second Battalion of Engineers.

LIEUT. WILLIAM A. MITCHELL.

November 1, 1902.—Arrived at Manila, P. I., on transport *Thomas* and assigned to Company H, Second Battalion of Engineers. In charge of post laundry; instructor in cavalry, infantry, and aparejo drills, reconnaissance, and school for noncommissioned officers.

December 10–15, 1902.—Engaged in constructing a map of Sampalve Hill, near Mariveles, Bataan Province.

December 24–28, 1902.—Inspecting proposed site for four-company post at Los Banos, Laguna Province.

January 11–20, 1903.—Engaged in survey of proposed site for a military post near Mariveles, Bataan Province.

February 4–9, 1903.—En route to Iligan, Mindanao.

February 10 to April 20, 1903.—In camp near Iligan; on duty with Company G, Second Battalion of Engineers, constructing the Iligan-Lake Lanao military road.

April 21 to May 11, 1903.—Engaged in survey of military reservation at Nonucan, Mindanao.

May 11 to June 30, 1903.—In charge of construction of wharf at Iligan and of bridge over Nonucan River.

June 2, 1903.—Assigned to Company I, Third Battalion of Engineers.

LIEUT. WARREN T. HANNUM.

November 1, 1902.—Arrived at Manila, P. I., on transport *Thomas* and assigned to Company H, Second Battalion of Engineers. Instructing the enlisted men of the engineer garrison, Manila, P. I., in infantry, cavalry, and practical military engineering drills.

December 9-23, 1902.—Engaged in making a survey of Malahi Island, Laguna de Bay, Luzon.

February 17-25, 1903.—En route to Cebu, Cebu, to make topographical surveys of sites for gun emplacements projected for fortifying the harbor of Cebu. Engaged on these surveys until April 10, 1903.

April 11-16, 1903.—En route to Manila, P. I.

April 17-30, 1903.—Preparing maps and report on surveys at Cebu.

May 17-21, 1903.—En route to Jolo, Jolo.

May 21 to June 30, 1903.—In charge of construction of a wharf at Jolo, Jolo. Disbursing officer of public civil funds for construction of wharf at Jolo and for construction of wharf at Siasi.

June 2, 1903.—Assigned to Company K, Third Battalion of Engineers.

* * * * *

Very respectfully, your obedient servant,

G. L. GILLESPIE,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF THE CHIEF OF ORDNANCE.

WAR 1903—VOL 2—18

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REPORT OF THE CHIEF OF ORDNANCE.

OFFICE OF THE CHIEF OF ORDNANCE,
UNITED STATES ARMY,
Washington, November 2, 1903.

SIR: 1. I have the honor to submit the following report of the principal operations of the Ordnance Department during the past year, together with certain remarks as to its interests and necessities.

2. The fiscal resources and expenditures of the Department during the year were as follows, viz:

Amount in the Treasury to the credit of the appropriations on June 30, 1902	\$10,014,195.24
Amount in the Treasury not reported to the credit of the appropriations on June 30, 1902	3,965.62
Amount in Government depositories to the credit of disbursing officers and others on June 30, 1902	1,621,099.14
Amount of appropriations for the service of the fiscal year ended June 30, 1903, including the appropriation for armament of fortifications in the act approved March 3, 1903	9,578,673.72
Amounts refunded to ordnance appropriations in settling accounts during the fiscal year ended June 30, 1903	763,420.48
Gross amount received during the fiscal year ended June 30, 1903, from sales to officers, from rents, from collections from troops on account of losses of or damage to ordnance stores, from Chicago, Rock Island and Pacific Railroad Company, from powder and projectiles (proceeds of sales), from sales of condemned stores, from testing machine, and from all other sources not before mentioned ..	265,342.71
Total	<u>22,246,696.91</u>
Amount of expenditures during the fiscal year ended June 30, 1903, including expenses attending sales of condemned stores, exchange of powder, etc.	9,104,098.15
Amount deposited in Treasury during the fiscal year ended June 30, 1903, as proceeds of sales of Government property	175,813.08
Amount turned into the surplus fund on June 30, 1903	248,786.48
Amount in Government depositories to the credit of disbursing officers and others on June 30, 1903	1,554,354.56
Amount transferred from ordnance appropriations in settling accounts during the fiscal year ended June 30, 1903	117,283.22
Amount in the Treasury not reported to the credit of appropriations on June 30, 1903	36,315.78
Amount in the Treasury to the credit of appropriations on June 30, 1903	<u>11,010,045.84</u>
Total	<u>22,246,696.91</u>

SALE OF OLD ORDNANCE AND ORDNANCE STORES AT ARSENALS AND FORTIFICATIONS UNDER REVISED STATUTES, 1241.

3. The proceeds of sales of condemned ordnance material at the various ordnance establishments and other military posts during the past fiscal year, amounting to \$113,662.02, has been deposited in the Treasury of the United States.

REDUCTION OF APPROPRIATION HEADINGS.

4. In connection with the preceding statement of the various amounts received and expended under the above headings, your attention is invited to the fact that because of the large number of separate appropriations made for the various purposes under the control of this Department, amounting in all to approximately one hundred and sixty, the clerical labor involved in accounting for the sums appropriated under each separate appropriation is great and exacting.

5. This large number of appropriations has arisen in great measure from submitting individual estimates for specific purposes involved in the armament of fortifications and in making improvements at the various arsenals and other ordnance establishments. It places this Department at a disadvantage as compared with other bureaus of the War Department. Omitting appropriations made for certified claims, the Subsistence and Pay departments have each only one appropriation under which all public funds expended by those departments are accounted for. The amounts disbursed by the Pay Department and Subsistence Department each under one appropriation heading approximate \$33,000,000 and \$11,000,000, respectively. For the Signal Corps there are two appropriations, for the Medical Department there are five appropriations, and for the Quartermaster's Department there are sixteen. All the supplies issued to the Army by the Medical Department are procured from one appropriation, by the Signal Corps from one appropriation, and by the Quartermaster's Department from practically three appropriations, whereas for the issue of ordnance stores to the Army, excluding those stores issued for the armament of fortifications, there are no less than seven, and under the heading "Armament of fortifications" there are practically sixty separate appropriations. While in the other bureaus supplies may be procured and issued to the Army under the number of appropriations stated above, in this Department there is a separate appropriation for each of the following classes of stores: Ammunition, equipments, ammunition for morning and evening gun, artillery targets, small arms (and these separate appropriations are in addition to the sixty appropriations made for the armament of fortifications, and which include machine, field, siege, and seacoast cannon, with their carriages, ammunition, etc., issued to the service), and for those articles not covered by separate appropriations referred to above there is an additional appropriation called "Ordnance stores, manufacture, etc."

6. It is very desirable to have the number of appropriations reduced so that public business can be transacted with greater facility, and at the same time the appropriations be sufficiently numerous to indicate clearly the amounts required for definite classes and groups of ordnance and ordnance stores. While the appropriation for regular supplies, Quartermaster's Department, provides for procuring the same, it also provides for repairing and maintaining those supplies in service; whereas for the care and preservation of ordnance stores there are two specific appropriations, one for the repairs and one for the preservation of the stores. It is desired later to recommend for the consideration of Congress a reduction in the number of appropriations for the service of this Department, embodying under each appropriation separate and distinct classes and groups of ordnance and ordnance stores. In the appropriation acts for the support of the Army and for sundry civil

expenses five appropriations will be recommended instead of ten, as at present. It will also be recommended that the sixty, more or less, appropriations made for the armament of fortifications be reduced to nine.

7. The appropriations will thus number fourteen only, and each appropriation will cover expenditures made for separate and distinct groups of ordnance stores and supplies.

8. The specific appropriations made for various purposes at arsenals and other ordnance establishments are, as stated above, numerous, and in the estimates submitted for the consideration of Congress legislation was recommended to provide for accounting for the separate appropriations made for each ordnance establishment under the appropriation title of that establishment. At the various arsenals the number of specific appropriations to be accounted for averages about seven, but for the proving ground the number amounts to nineteen, and these are all in addition to the regular appropriations for the service of the Department, all of which are expended at the various ordnance establishments. Even if the reduction of appropriations as recommended be enacted by Congress the number of appropriations will still be numerous, since Congress frequently makes specific appropriations for certain purposes such as prizes for target practice; Gathmann gun, Emery loading apparatus; pneumatic dynamite guns; Isham shell, etc.

PAYMENT OF EMPLOYEES.

9. At the last session of Congress an act was passed providing that all employees of the Government paid under the army appropriation act, drawing annual salaries, should be paid monthly at a rate of one-twelfth of the annual rate, and for any part of a month the rate of pay should be based upon a month of thirty days. In view of the fact that some of the appropriations disbursed by this Department are embraced in the army appropriation act, but the greater number in the act providing for the armament of fortifications and other acts of Congress, the method of computing the rate of pay of employees drawing annual salaries and employed on work authorized by appropriations contained in different acts of Congress has led to a great deal of confusion. In the estimates submitted legislation is recommended providing for a uniform system of making payments throughout the Department, which will be in harmony with the legislation enacted at the last session of Congress.

PURCHASES.

10. The act of Congress authorizing this Department to procure in open market, in the manner common among business men, ordnance stores and supplies where the amount involved does not exceed \$200, has proved a great convenience to the Department, but the clerical labor involved in making reports of all such purchases to your office is considerable. Although the act authorizes purchases up to \$200 fully 75 per cent of the purchases made under it do not amount in value to more than \$20 each, and in the estimates for the consideration of the forthcoming session of Congress it was recommended that only purchases exceeding \$100 in value should be reported. This recommendation is believed to be very reasonable, as under the present law an officer may make an open-market purchase by reason of emergency up to \$200 without having to report the same.

DISPOSITION OF FUNDS RECEIVED FROM SALES AND TRANSFERS.

11. In the matter of collecting and accounting for funds received by the Department, the clerical labor is much larger than it should be by reason of the fact that the legislation governing the disposition of funds arising from the sale and transfer of ordnance stores is not uniform. While sales made to the militia of the various States are credited to the appropriations out of which the stores sold were procured, the cost of all issues to the same organizations is credited to the appropriation for the manufacture of arms at the national armories; while stores sold to officers of the Army for their personal use are credited to the appropriations out of which procured, deductions made from the pay of enlisted men on account of loss or damage to ordnance stores are credited to the appropriation for the manufacture of arms at the national armories; while the funds arising from a sale made to a State for the use of its militia are available until exhausted, the funds arising from sales made to other bureaus of the War Department and to the Executive Departments revert to the appropriations out of which procured, and have only the lifetime of these appropriations for use in replacing the stores so sold. In case of sales made to the Philippine government, Congress has provided that the funds shall be available throughout the present fiscal year only. It is apparent that these ununiform methods of accounting for ordnance property sold or transferred are very exacting, and involve a great deal of clerical work. In the estimates submitted for the consideration of the forthcoming session of Congress it is recommended that legislation be enacted to provide that all funds arising from authorized sales or transfers of ordnance stores shall constitute one fund on the books of the Treasury Department, for the purpose of replacing like ordnance stores so sold or transferred.

BLANKS.

12. With a view to simplifying the executing and rendering of accounts for public funds the various blanks in use in the Department have been modified so as to provide for executing them on a typewriter, and the necessary instructions have been printed on these blanks with a view to furnishing officers all assistance necessary in executing them. The simplification of the blanks will result also in decreasing their number, and having modified them so as to provide for making several copies on a typewriter at the same time, it is believed the result will be a reduction in the clerical labor involved in rendering accounts. The blanks involved in making purchases are now being modified so that the same sets of blanks may be used throughout the Department, dispensing with the use of special blanks for the various arsenals and other ordnance establishments.

DISPOSITION OF CONDEMNED CANNON, ETC.

13. The act of Congress approved May 22, 1896, provides—

That the Secretary of War and the Secretary of the Navy are each hereby authorized, in their discretion, to loan or give to soldiers' monumental associations, posts of the Grand Army of the Republic, and municipal corporations, condemned ordnance, guns, and cannon balls which may not be needed in the service of either of said

Departments. Such loan or gift shall be made subject to rules and regulations covering the same in each Department, and the Government shall be at no expense in connection with any such loan or gift.

14. Under the provisions of this act donations have thus far been made to Grand Army posts, monumental associations, and municipal corporations to the extent of 967 cannon and 12,707 projectiles. The donations during the past fiscal year are shown to be 90 cannon and 1,543 projectiles.

PROPERTY RETURNS.

15. In accordance with the suggestion of this Department, Congress, at its last session, enacted that the returns of officers accountable for property of the Ordnance Department should hereafter be made semi-annually, instead of quarterly; it is still too early to say what measure of relief will result from this legislation. In fixing the period at which property returns shall be made it is necessary to balance the saving of labor effected by longer periods against the difficulty of detecting errors, which may have occurred so far back as to have escaped the memory, and the disadvantage of officers upon field service of the necessity for carrying "live" papers with them for long periods before they can be disposed of as having been filed with a return. It is believed, however, that the six months' interval will be found substantially less onerous than that of the quarter year in time of peace; in time of war the whole subject of property accountability necessarily assumes diminished importance.

16. The following tabular statement exhibits the condition of the work at present in this division of the Ordnance Office and the amount of work done during the fiscal year:

	Number of returns not closed June 30, 1902.	Number of returns received.	Total.	Acted on during year.		Number of returns not closed June 30, 1903.
				Finally exam- ined.	Closed.	
Arsenals and inspectors.....	33	59	92	67	72	20
Regular Army	3,463	9,166	12,629	8,772	9,197	3,432
Volunteer Army	123	27	150	17	49	101
Spanish war volunteers.....	11	26	37	19	37	.....
Total.....	3,630	9,278	12,908	8,875	9,355	3,563

CONDITION.

Awaiting final examination June 30, 1902	2,102
Awaiting result of correspondence June 30, 1902	1,528
Total.....	3,630
Awaiting final examination June 30, 1903	2,505
Awaiting result of correspondence June 30, 1903	1,048
Total.....	3,553

DETAILED STATEMENT.

Closed	9,355
Examined	8,875
Settled by correspondence	480
Awaiting result of correspondence June 30, 1902	1,528
Awaiting result of correspondence June 30, 1903	1,048
Awaiting final examination June 30, 1903	2,505
Total.....	3,553

17. The preliminary examination of property returns was instituted at the Manila ordnance depot in 1900, and has been carried on since that date with advantage to officers accountable for property in the Division of the Philippines. The examination of these returns before forwarding them to the Ordnance Office prevents any great length of time elapsing before an officer hears from his accounts, and enables him to correct with greater facility any errors that may occur, as the transactions are still fresh in his mind. He is also able to collect any necessary data which may be required from other officers concerned before they are transferred to some distant station. The returns when forwarded from Manila are in a condition to be readily settled upon arrival at Washington.

18. The following is a summary of the work done in the returns division of the depot for the past year:

Returns on hand July 1, 1902:	
Unexamined.....	1, 190
Examined and held for correction.....	359
	<hr/> 1, 549
Returns received during the period.....	3, 776
	<hr/> 5, 325
Returns sent to the Chief of Ordnance.....	4, 213
	<hr/> 1, 112
Total on hand July 1, 1903.....	111
Total of these held for correction.....	228
Total of these held for comparison.....	<hr/> 339
Total number examined and held.....	773
Total number unexamined.....	

DISTRIBUTION OF SUPPLIES.

19. About two years ago the Department inaugurated a system of decentralization in the matter of the issue of standard ordnance stores to the Army, and the making of certain repairs. According to this system repairs to all field batteries, except those of the breech mechanisms, are to be made by communicating direct with certain designated officers, instead of with this office. All repairs to breech mechanisms are to be made by communicating directly with the commanding officer, Watervliet Arsenal. Standard ordnance supplies for field batteries are to be furnished directly by the commanding officers of Watervliet, Rock Island, San Antonio, and Benicia arsenals, depending upon the departments in which the batteries are located. Requisitions for guns, carriages, caissons, limbers, wagons, and ammunition only are to be sent to the Chief of Ordnance.

20. The order upon the subject of the issue of supplies enumerates a large class of ordnance stores which are to be furnished directly from the arsenals upon the approval of the requisitions by the department commanders. In order to carry out the provisions of this order considerable quantities of the various articles of ordnance and ordnance stores specified were sent from the manufacturing arsenals to the Benicia, San Antonio, Augusta, New York, and Watervliet arsenals as distributing centers. In general the ordnance stores subject to direct issue from the arsenals are standard equipments for cavalry, infantry, and field artillery; horse equipments, cleaning materials, small arms, small-arms ammunition, targets and target material,

reloading tools, stencil and marking outfits, arm racks, fencing implements, saddlers' materials and instruments, equipments, spare parts, and expendable material for field artillery.

21. Each of the above-named arsenals was furnished with supplies sufficient to equip 1,500 cavalry, 5,000 infantry, and two batteries of field artillery, and these arsenals were instructed to keep up the supply by timely requisitions on the Department, the only exception being Augusta Arsenal, Ga., which lacked sufficient storage room. This plan has been carried out from December, 1901, until a recent period, when, on account of the heavy calls for arms and equipments to supply the militia under the act of Congress approved January 21, 1903, the stock of magazine arms and their equipments at the several arsenals has been temporarily reduced below the required reserve. The different orders which have issued have been consolidated in General Order No. 5 of 1903.

22. The plan has worked well in practice and has operated to the relief of this office and to improvement in the promptness with which the troops are supplied. It was inaugurated by Capt. W. W. Gibson while in charge of the supply division of the office.

CLERICAL FORCE.

23. The force of this office now consists of 67 clerks, which is 8 less than that of the last fiscal year. This force has sometimes been hard pressed to keep up the work of the office, and it has been necessary at times for parts of it to work after hours and during evenings. It is thought, however, that with the introduction of certain changes of method, whose object has been to diminish the clerical work both by better systematization and by dispensing with some that has been considered unnecessary, the force may be able to properly handle the business. I have, therefore, in accordance with the requirement of law, submitted an estimate for the same number for the coming fiscal year.

UNITED STATES MAGAZINE RIFLE, MODEL OF 1903.

24. At the date of my last annual report orders for the fabrication of 5,000 muskets for trial in service had been given, following the completion and trial of an experimental gun. As preparations for the manufacture of the 5,000 advanced it became evident that a very long time would be required after their completion for a satisfactory trial of them in the service, for subsequent steps necessary to their formal adoption, and for the preparations for their ultimate manufacture in large quantities for issue to the service. The performance of the few muskets of the type which were made by hand was so satisfactory that it was considered by this Department advisable to attempt to arrive at a conclusion in regard to the adoption of the gun for service without going through the process of a trial of the 5,000 in the hands of troops.

25. Upon representation to this effect a board was convened, consisting of officers of cavalry, infantry, and the Ordnance Department, of which Capt. Frederick S. Foltz, Second Cavalry, was president, for the purpose of subjecting the gun to a thorough and exhaustive series of tests. A number of enlisted men were detailed to assist the board, all being expert riflemen.

26. As a result of the tests a good many changes were embodied in the arm, the most important of which were the following:

First. The length of the barrel was reduced from 30 to 24 inches, enabling the same arm to be used by all branches of the service, and the carbine to be dispensed with.

Second. The rear sight was moved to the rear against the receiver and secured to the barrel by a sleeve, thereby doing away with the screws formerly used.

The above changes were originally suggested by the commanding officer, Springfield Armory.

Third. The hand guard was extended forward to the upper band to more fully protect the hand from the heat generated in firing.

Fourth. The rod bayonet was reduced in length and shaped so as to prevent its use as a cleaning rod. For cleaning the bore in the field a thong, to be carried with the oiler in the butt of the stock, was added.

Fifth. The area of the bearing surface of the rear bolt lug in the receiver was increased.

Sixth. A spring catch was added to prevent the bolt from slipping forward under the clip seat when the arm is held with the barrel inclined downward.

27. The board found that the general design and ballistic qualities of this rifle were markedly superior to those of the present service arm, and recommended its adoption for the military service.

28. A firing exhibition of the rifle was then made by the different members of the board at ten military posts, at which a total of 223 officers and 4,669 enlisted men were serving. These officers and men were practically unanimous in favor of the adoption of the new arm.

29. The new rifle was also referred to the infantry board at Fort Leavenworth, Kans., and to the cavalry board at Fort Riley, Kans., both of which unanimously recommended the adoption of 24 inches as the length of barrel for all arms of the service.

30. In view of the unanimity of opinion regarding the superiority of this over the present service arm, the Chief of Ordnance recommended its adoption and manufacture, which recommendation was approved by the Secretary of War on June 19, 1903. This arm will be designated as the United States magazine rifle, model of 1903.

31. A cartridge for the new rifle has been developed at Frankford Arsenal, and exhaustive firing tests have proved it to be most satisfactory. These cartridges will be packed in clips each holding five, from which the magazine can be quickly and easily filled.

32. The subject of an automatic musket is in about the same state as described in my last annual report—that is, no musket of satisfactory mechanical action has been presented to the Department, and therefore the tactical question of the desirability of the adoption of such an arm does not come up for consideration. The Department is encouraging inventors who approach it upon the subject of the production of an automatic musket, as it seems that the principle—being in line of the reduction of the interval between aimed shots—follows the course which led to the introduction of the magazine rifle, and has therefore at least sufficient promise of value to be worthy of attention to the degree necessary to advance the question from a mechanical to a military one.

33. Experiments with automatic pistols, and their trial in the hands of troops have continued during the year; but the conflicting reports

of the advantages and disadvantages of the weapons issued for trial received from officers in command of troops have not been such as to warrant the abandonment of the present service revolver for any of the types tried. The Department will continue to give attention to this subject, which is more advanced than that of the automatic musket.

EQUIPMENTS.

34. *Cartridge belt*.—The adoption of the new cartridge and the method of packing it in clips necessitated a change in the cartridge belt issued for field service. A khaki-colored woven belt with nine pockets, each holding ten cartridges, has been adopted and a contract made for 100,000. The canteen, haversack, and pouch for first-aid packet will be attached to the lower edge of the belt by hooks, or clips, and the weight of the belt, cartridges, etc., transferred to the shoulders by suspenders. This method of carrying the canteen and haversack does away with the canteen and haversack straps and relieves the soldier's chest from the pressure brought upon it by them.

35. *Bandoleer*.—Experiments are being made to develop a cheap cloth bandoleer, having six pockets, in which 60 cartridges can be packed. If these experiments are successful, all ammunition will be packed and issued in bandoleers, as in this form an extra supply of ammunition can be most conveniently carried by the soldier and distributed to the firing line.

36. *Use of russet leather*.—By General Orders, No. 81, Headquarters of the Army, dated July 17, 1902, stuffed russet leather was prescribed for all leather equipments. The leather prescribed by this order was immediately procured and the manufacture and issue of the new equipments commenced. As complaints were received that this leather contained so much oil that it soiled the soldier's clothing, the amount of oil in the leather has been reduced. By this same order a cartridge box and waist belt of stuffed russet leather were prescribed for use in garrison; a large number of these articles have already been manufactured and issued to troops.

In order that the change from black to stuffed russet leather equipments may be made as rapidly as consistent with economy, the manufacture of complete black leather equipments has been stopped, and only such component parts will hereafter be made as may be necessary to replace those worn out in service. As fast as these equipments become so worn as to make the cost of repair an appreciable percentage of their value they will be replaced by those made of stuffed russet leather.

16-INCH GUN.

37. Guns of this caliber were called for in the report of the Fortification Board in 1885. As a result this gun was built as a type for future construction. As no gun of this high power had ever been built, and as a special powder had to be made for it, the test was watched with much interest. It was designed to fire a 2,400-pound projectile with a muzzle velocity of 2,300 feet per second and a powder pressure not exceeding 38,000 pounds per square inch.

38. The proof firing was attended with entire success. At the fourth round with a charge of 640 pounds of Du Pont's smokeless powder and a 2,400-pound projectile, a velocity of 2,317 feet

per second with a pressure of 36,700 pounds per square inch was attained. That the design and construction of such a huge weapon should be successfully accomplished without a mishap of any kind, and that the calculated ballistic results should be so accurately verified, are subjects of gratification. The use of smokeless powder in such large charges was beyond the experience of the world, and the demonstration that it would when so used follow the same law of burning as with charges of the size previously employed is a service to the art of the construction of ordnance. Whether this gun will be reproduced for use in seacoast fortifications is a matter still to be determined; there are at present no plans calling for its installation, but it is satisfactory to know from the results of actual trial that, in considering at any time the desirability of employing guns of greater power than those of the caliber, 12 inches, now constituting our most powerful weapons, the subject need not be complicated by the question of practicability.

39. The gun is at present mounted on a proof carriage, a service carriage not yet having been built for it.

EXPERIMENTAL GUNS.

40. *Ten-inch Brown segmental tube wire gun.*—The construction of this gun was commenced in 1897, under an allotment from the Board of Ordnance and Fortification. The gun was completed some time since and the test commenced, but this was interrupted by accidents which, however, did not affect the main principles of the system. The damage resulting from the accidents has been repaired and the test is continuing.

41. *Six-inch Brown segmental tube wire gun.*—During the past year the Board of Ordnance and Fortification has made an allotment for the construction of this gun, the allotment also including the mount and a supply of ammunition. These are all under construction under contract with this Department.

42. *Six-inch wire-wound gun, Ordnance Department design.*—In April last a letter was addressed to the Secretary of War submitting a design for a 6-inch wire-wound gun from which the following is an extract:

6. In view of the recent action of the Board of Ordnance and Fortification allotting the sum of \$42,500 for the construction and test of a wire-wound gun of another type, with its mount, the subject assumes a new importance, and it seems desirable to be able to compare the gun to be built from this allotment with one of a previously tested and approved design of the same caliber, it possibly being difficult to properly compare guns of such different character as one of 10 inches and one of 6 inches caliber. This design is therefore submitted with the object of permitting as much light upon the subject as may be had either by the construction and test of a gun or by discussion.

43. The Board of Ordnance and Fortifications, to which the subject was referred, made an allotment for the construction of the gun and it is now proceeding.

44. *A 6-inch Bofors R. F. gun and mount* with semiautomatic breech action has been tested with most satisfactory results. This mechanism has successfully withstood pressures of 70,000 pounds per square inch, besides passing the regular tests for such material. Arrangements have been made to apply this breech mechanism (without the semiautomatic feature) to 70 6-inch R. F. guns now under manufacture.

45. *Experimental field material.*—Although a satisfactory system of field artillery has been adopted this Department continues to test experimental material of promising design. Five different breech mechanisms for field guns have recently been completed and will be tested for the purpose of developing new features that may be of use in service.

FIELD ARTILLERY.

46. Work upon the new 3-inch field artillery material is now progressing satisfactorily, although considerable delays were at first experienced. The material required in these constructions is, in general, of superior quality, and difficulty in procuring it has been experienced, but is disappearing, and that of the quality desired is now being received in sufficient quantities to promise no further delays.

47. The work of manufacture, in connection with the work required for gauges, test tools, and models, has necessitated the employment of a higher class of machinists and a consequent increase in the average rate of pay. Skilled labor of the class required has been scarce in the vicinity of Rock Island Arsenal, where the carriages are under manufacture, and advertisements in the newspapers have failed to secure all the mechanics required.

48. The use of pressed steel for many of the parts of the new carriages, limbers, and caissons required the purchase of a few hydraulic presses for its manufacture. The work of manufacture has, however, not been delayed for the lack of these tools, arrangements having been made for the limited use of hydraulic presses in the vicinity of Rock Island Arsenal.

49. There are under construction 25 batteries for the regular service and 16 for the militia, the latter being manufactured under allotments made from the appropriation "New arms and equipments for the organized militia," made to carry out the provision of law that the armament, etc., of this force shall be the same as that of the Regular Army.

50. With a view of ascertaining the merits of power transportation for artillery wagons this Department has purchased during the year, under specifications prepared by it, an automobile battery wagon and forge. This wagon was selected for such equipment as it is generally parked near lines of communication and is not required to traverse country of the character likely to be encountered by pieces in taking position for engagement. It is a combined supply and store wagon and workshop, and is equipped with a gasoline engine of a rated capacity of 28 horse power, of the 4-cylinder type. The maximum speed developed is about 12 miles per hour, insuring, it is thought, power enough to transport the wagon at reduced rates of speed over all kinds of ground. At the front end of the wagon a winch has been provided with suitable connections to the engine to pull the wagon forward if it should happen to be stalled in the mud. Mechanists', carpenters', saddlers', farriers', tools and supplies, and spare parts in sufficient quantities are carried. The weight of the wagon, loaded, will be about 10,000 pounds. Upon the receipt of the wagon, which is expected in a short time, a series of experiments in the field will be made from which useful results are expected.

51. The caisson for the new material differs from that now in use with the 3.2-inch B. L. rifle in being a metal fabrication, and in hav-

ing a single chest, instead of two, upon the caisson body—this for the purpose of lightening the construction. Means for carrying spare wheels are omitted from the caisson, and these will be carried on the combined forge and battery wagon. Each caisson has a pintle at its rear end, which will permit coupling caissons together in a column of vehicles, should it ever be considered desirable to haul several of them with the same power. The caisson, forge and battery wagon, and artillery store wagon have all been designed at the Rock Island Arsenal by Capt. George W. Burr, of the Ordnance Department, and, embodying many new features of construction, are creditable productions.

52. *Combination fuses.*—The increased range of modern field guns has led to the necessity for redesigning the service fuse to meet the increase in the time of flight. Two time trains of different compositions, one manufactured by the DuPont Powder Company and the other at Frankford Arsenal, are now undergoing test. To meet immediate needs the Department has ordered 20,000 combination fuses from abroad of a type that proved satisfactory in the test of field material held last year.

MOUNTAIN ARTILLERY.

53. The manufacture of 90 mountain guns, carriages, and pack outfits of the Vickers Sons & Maxim system has progressed during the year with more or less delay, the principal cause being the inability of the Department to procure in this country satisfactory recuperator springs. Constant efforts have, however, been made to overcome this difficulty, and it is thought with success.

54. During the manufacture of this material certain improvements have been suggested and embodied, and the use of the material in the Philippines has indicated that desirable changes in the method of transporting it on pack mules are necessary. With a view to improving this feature, experiments were conducted at the Manila ordnance depot, and a pack outfit as altered was forwarded to this country for consideration by a board of officers. Among the defects noted in the Vickers, Sons & Maxim pack outfits are the following: Seat too small; insufficient bearing; insufficient stiffness and stability; weight of load can not be distributed at will of packer and must be borne principally on the side bars, and can not be arranged so that the remaining parts of the saddle give their full share of support to the load, resulting in the disadvantage of being unable to obtain the maximum value of the mule's carrying capacity; this defect also does not permit sore spots on the animal's back to be relieved by a change in the packing. The means of securing the saddle by buckles was so evidently faulty that they were changed, at first by the substitution of two canvas cinchas and later by one broad hair cincha. Straps with buckles were provided, but these were found entirely impracticable as leather straps stretch, especially when wet, and the buckles do not permit of differential adjustment and so allow the load to slip, or become entirely dislodged.

55. The system recommended by the board of officers, which will be embodied in the material under manufacture, consists of a frame fitted to the aparejo and attached thereto by the aparejo cincha, supplemented by simple lashings, which take the place of the lash rope and diamond hitch. The feature of this new system is the substitu-

tion of latigo straps and rendering rings for the multiplicity of straps and buckles of the English saddle, thus permitting accurate adjustment of the lashing by differential cinching, and at the same time adding greatly to the durability of the equipment.

56. The aparejo to be used will be a modification of the regulation supplied by the Quartermaster's Department, with a view to facilitating packing. The regular aparejo requires "setting up" upon its receipt. This consists in inserting within it a large number of willow sticks, and requires the exercise of a great deal of skill and care. In the opinion of the board this "setting up" is not necessary, and with a view to securing uniformity and dispensing with the services of a skilled packer, the old style of boot sticks and willow wands are to be replaced by dressed hickory wands and basswood boot and top sticks prepared by the Department after special designs. It is to be noted that the best feature of the aparejo is its general adaptability.

SIEGE ARTILLERY.

57. The new carriage for the 7-inch siege howitzer, referred to in my last report, has given satisfactory results during the year in service. It is, however, not a finality in its class. The Department has continued its efforts with a view to preparing new designs for the rearmament of the siege artillery service; these are partially completed, and when reduced to practice will increase its efficiency, principally by increasing its rapidity of fire.

SALUTING GUNS.

58. The pieces which are at present used for saluting purposes and for firing the morning and evening guns at posts are nearly all of the old 3-inch wrought-iron type or 12-pounder bronze smooth bores. These guns are not safe, and at intervals accidents resulting from their use are reported. It has been prescribed in orders that breech-loading guns for these purposes shall be used wherever possible, but at many posts, especially those of the interior of this country and of the insular possessions, there are no such guns and the muzzle-loaders have still to be used. It would be uneconomical to take from the limited supply of breech-loading rifles which are on hand guns to be used only for saluting purposes, which would thus be withdrawn from the uses for which they were procured, and this Department has therefore made efforts to arrive at a method for utilizing the 3-inch rifles on hand by converting them into breech-loading guns at a cost which would make the change advantageous. A satisfactory method of conversion has been developed, and a suitable gun using the 6-pounder metallic ammunition can be had for a reasonable cost. The work of converting a sufficient number will be prosecuted as rapidly as funds are available. A number have been put in hand and estimate made to cover others.

CANNON, SEACOAST GUNS, AMMUNITION, ETC.

59. A number of rapid-fire guns of 6-inch caliber have been mounted during the year. These guns have a velocity of 2,600 feet per second. There are now nearing completion forty-six 6-inch rapid-fire guns of .50-caliber length of bore, designed to give a muzzle velocity of 3,000

feet per second. Several of these guns have been completed and issued to various establishments for testing carriages under construction. All will be emplaced in the near future.

60. A firing mechanism has been developed within the year; it permits the insertion of the primer after the manner of a small-arm cartridge while the breech is open. The primer may be fired either electrically or by friction, and has the necessary safety features to prevent firing until the breech is closed and locked. Mechanisms of this design are now under manufacture for every seacoast gun and mortar in service; they are fairly satisfactory and constitute an advance over what they replace, but there is room for the improvement which is being sought.

61. One high-powered 12-inch B. L. rifle, model of 1900, has been mounted in New York Harbor and tested. This gun, firing a projectile weighing 1,048 pounds with a velocity of 2,550 feet per second, has a calculated muzzle penetration of 37 inches of face-hardened armor. Two more guns of this type are completed and eight are nearing completion. The development in high-powered guns of large caliber in recent years may be shown by comparing the muzzle energies of the 12-inch B. L. rifle, model of 1888, using brown powder, and the same for the 12-inch B. L. rifle, model of 1900. The model 1888 gun gave 28,000 foot-tons of energy at the muzzle, while the model 1900 gives 45,000 foot-tons, an increase of about 60 per cent.

62. *High explosives.*—A considerable supply of high explosives for filling shells has been secured and is being loaded into projectiles as rapidly as the present plant will admit. The installation of a loading plant for this material has been attended with some difficulty. Special machinery had to be designed and built and buildings planned to afford protection to the operators and facility for handling the heavy projectiles in quantity.

63. During the year a 12-inch mortar has been destroyed by the premature bursting in the bore of a torpedo shell charged with high explosive; the cause of the accident is believed to have been the weakness of the projectile, which was of cast steel. The use of these projectiles in the service has been discontinued as a consequence of the accident, and if further investigation shall confirm the idea now held the supply of them on hand will be expended in target practice without explosive charge. In the meantime a stronger torpedo shell will be designed, to be made of forged steel, and possibly sacrificing some of its interior capacity to the necessity for greater strength.

64. *Powders.*—Contracts for the following quantities have been let during the year: 496,637 pounds of smokeless for the various calibers of seacoast, field, and siege guns; 304,000 pounds of saluting for all calibers, and 75,000 pounds of musket powder, black, used for igniting charges with smokeless powder. Of this nearly all has been delivered and the remainder will be received in the near future.

65. The manufacture of smokeless powders is progressing satisfactorily. No modification of the composition has been made and the results obtained, although not as good as are hoped for, are believed to be equal to those given by any powder made abroad.

66. The Department has recently installed a refrigerating and heating plant at the proving ground for the purpose of investigating the effect of heat and cold on powders, and of determining if possible the laws of variation in pressures and velocities for changes in tempera-

ture. Tests thus far made indicate that temperature has a marked effect on smokeless powders. Laboratory and proof tests during the year have led to the general revision of the specifications, the most important of which are, first, change in the heat test, which now requires the exposure of a sample for forty-eight hours to a temperature of 115° F. Under such conditions the loss in weight must not exceed 8 per cent. Second, the introduction of a compression test to determine the toughness of the colloid.

67. Retests of lots of smokeless powder that had been in store more than a year have been systematically made. From these it appears that the ballistics of most lots will change during storage, and that in general the pressures and velocities will increase. It is also noted that many lots (notably those showing lack of toughness) give very irregular results when fired under high pressures (i. e., pressures between 38,000 and 40,000 pounds per square inch). In such cases there appears to be a critical point in the pressure which when reached with a normal charge fluctuates, together with the velocity, for the same charge. To meet this the Department has recommended the reduction of the service velocities about 50 feet per second, the pressures corresponding to this reduction being sufficiently far from the "critical pressure" to insure uniform ballistic results and corresponding increase in accuracy of firing.

68. Of the elements which go to make up the power of a gun the powder must now be considered, notwithstanding comparatively recent very great advances, as being in the most backward stage. It is quite possible to construct cannon of sufficient strength to resist a pressure as high as 45,000 pounds to the square inch, and projectiles can be produced of sufficient toughness and hardness to utilize the velocity resulting from such pressures when fired against armor plate; but when it is attempted to use the powder at a pressure higher than about 38,000 pounds per square inch it is found that no certainty can be had that it will not mount to a very much higher figure, one much beyond the assured strength of the gun. Investigations for determining the exact reasons for this behavior, it is hoped, may lead to their removal. These constitute now one of the most interesting studies occupying the Department.

69. There are three depots for the storage of powders, viz, United States powder depot, Dover, N. J., St. Louis powder depot, St. Louis, Mo., and Benicia Arsenal, Benicia, Cal.

70. Owing to the scarcity of ordnance officers the inspection of powders, which heretofore has been by resident inspectors, has been accomplished by the commanding officer of the United States powder depot for the International, etc., and the Laflin & Rand companies by an assistant in the Ordnance Office for the works of the E. I. DuPont Company, and for the California Powder Works by an assistant from Benicia Arsenal. While it is believed that the product has not suffered by this change, the system does not commend itself as that best suited to the interests of the service and the improvement of the manufacture, and will be abandoned as soon as officers can be secured.

71. A reserve supply of smokeless powders is being issued to the seacoast forts as rapidly as suitable storage cases can be manufactured from the limited appropriations available.

72. Armor-piercing projectiles, charged with high explosives, will be issued as rapidly as the loading plant can turn them out. The total

reserve on hand is only about half of what should be in the forts, and if all issued would leave none in the main depots for a general reserve.

SUBCALIBER AND DRILL PRACTICE.

73. Since my last report, subcaliber tubes have been completed for all rapid-fire guns and the manufacture of such tubes of 2.95-inch caliber for the 12-inch mortars has been commenced. This completes the equipment of the service with subcaliber tubes except as new installations may require them.

74. For both the 1-pounder and 2.95-inch subcaliber tubes large capacity point fuse shell have been designed and successfully tested. These will carry a relatively large bursting charge, thus greatly increasing the visibility of the striking point in practice; a matter of some importance in view of the difficulty of testing marksmanship by noting the point of impact of these small projectiles, especially upon water.

75. Drill and subcaliber primers for both the new form of vent and for the old screw vent have been manufactured and issued for trial. Certain defects have been developed in these and steps have been taken to correct them.

76. These primers are intended to be reloaded after the manner of a small-arms cartridge. For drill and saluting purposes it reduces the cost from 65 cents for the service primer to about $4\frac{1}{2}$ cents for the drill primer. As the supply of ammunition, etc., for target and subcaliber practice is limited by the annual appropriations, the large saving is apparent. One-pounder subcaliber ammunition costs about 80 cents per round. To use the service primer at a cost of 65 cents makes the cost of the latter disproportionate, and largely cuts down the allowance of subcaliber ammunition.

SEACOAST CARRIAGES.

77. The manufacture of seacoast carriages during the year has progressed without interruption to the extent permitted by appropriations made at the last session of Congress for the purpose. In addition to the limited number of carriages, being manufactured at Watertown Arsenal, contracts exist with the following private manufacturers, viz: For 15-pounder guns, carriages, and ammunition, with the Driggs-Seabury Gun and Ammunition Company and the Bethlehem Steel Company; for 6-inch barbette carriages, model of 1900, with the Builders' Iron Foundry; and for 12-inch disappearing carriages, with the Midvale Steel Company.

78. Much attention has been given to the installation on seacoast gun carriages of safety switches for permitting the firing by electricity of the guns mounted thereon, also to the illumination of all azimuth and elevation scales for night service. As the matter of percussion or electric firing of guns is still under consideration, no definite conclusion in regard to the proper method of wiring carriages, nor as to the safety arrangements, has been reached.

79. The manufacture of 6-inch barbette carriages has been delayed somewhat by the failure of American spring makers to furnish satisfactory counter-recoil springs, and to a certain extent the delivery of the carriages has been interfered with by the unsuccessful efforts of

the Department to procure shields for them at satisfactory prices. The lack of success in procuring these shields, it is thought, resulted in a measure from the fact that because little experience in ballistic resistance of shields mounted on gun carriages had been had in this country, and, so far as known, little exists abroad, there was a natural hesitancy on the part of manufacturers to accept the specifications of the Department in regard thereto. It is to be noted, however, that there are but two manufacturers in this country capable of supplying them, and that owing to a press of other work there was a disinclination to take up the manufacture of these shields in limited quantities.

80. In order to obtain information in regard to their manufacture and ballistic qualities a contract was made with the Bethlehem Steel Company for five harveyized shields in accordance with plans and specifications of the Department, and one shield was delivered for trial at the Sandy Hook proving ground. This shield was $4\frac{1}{2}$ inches thick, the extreme dimensions of the developed plate being 132 by 78 inches. The plate is bent to a cylindrical surface with a 44-inch radius and attached to the gun mount by spring supports on each side with the face inclined at an angle of 40 degrees to the horizontal. The shield, with its bolts and spring supports, weighs 10,800 pounds.

81. Fire was directed so as to subject all parts of the shield about equally to the forces arising from the impact of the projectiles, and the test included a variety of striking angles. At the conclusion of the firing the mount could be easily traversed, the pivot having received no injury. The shield remained in position, affording practically the same protection as originally, but was considerably damaged by cracks in the axial plane, which nearly divided the shield into two parts.

82. The test indicates that this shield is practically proof against penetration by projectiles of less caliber than 6 inches, since a 5-inch capped shot penetrated only 1.75 inches when fired at a simulated range of 2,140 yards for 3,000 feet per second muzzle velocity and a 48-degree angle of impact. Other 5-inch projectiles fired at a simulated range of about 3,300 yards, with a 60-degree angle of impact, produced no greater effect. With 6-inch projectiles the plate is over-matched, and may be perforated with angles of impact likely to occur in battle at ranges within about 3,000 yards.

83. These shields can be considered as efficacious and desirable for protection only against fire which is not able to perforate them. Where perforation is secured, and against the fire of heavier projectiles than 6-inch caliber, the shield, which can not be made thicker than $4\frac{1}{2}$ inches in view of weight and cost, becomes an element of danger.

84. Advantage has been taken of the test of the 12-inch disappearing carriage, L. F., model of 1901, to verify the accuracy of the formulæ heretofore used in the calculation of the throttling openings of the hydraulic recoil system of gun carriages. These experiments, while not completed, indicate that the pressures in recoil cylinders have been higher than those calculated, and indicate the necessary correction to be applied to decrease this increased resistance, which is thought to be principally due to the contraction of the liquid vein in the flow of the oil through the orifices.

85. Investigations have also been made with a view of ascertaining the suitability of a mixture of water and glycerin for use in recoil cylinders of gun carriages, to replace the neutral oil used by this Department. A mixture of glycerin and water is used abroad and in

the naval service of this country. It is understood it was originally chosen because of its low freezing point, noncorrosive properties, and cleanliness. Water has been added to govern the viscosity, and also because the affinity of glycerin for water caused the leather packing, formerly used, to become dry and ineffective. This mixture, not being greasy, is preferable to oil on shipboard, as it does not stain the decks. A mixture of 80 per cent glycerin and 20 per cent water is generally adopted for use in naval mounts.

86. One reason for making this investigation was to determine, if possible, a mixture which would be less likely to rust parts of the hydraulic system than the oil now used in our service. It is to be understood that in refining oil acids are used which must afterwards be entirely neutralized, otherwise rusting of parts will result. Under more recent specifications the Department has succeeded in procuring oil which is almost entirely free from these acids.

87. This investigation indicated that mixtures containing 50 per cent of glycerin or less are excessive rust producers. Mixtures of 80, 75, and 66 per cent produce rust slightly, and while rusting increases with the decrease of glycerin in the mixture, it is not much greater with the 66 per cent than with the 80 per cent mixture.

88. The tests indicated that neutral oil was superior to the glycerin mixture in every point except the cold test, but the latter, it is thought, will not prove a serious objection in service, as the oil ceases to flow only at zero Fahrenheit. Its noncorrosive qualities are equal to those of pure glycerin; its viscosity is more uniform than that of any glycerin mixture that may be used, and its cost is only about one-fourth of that of the glycerin mixture.

TELESCOPIC SIGHTS.

89. The telescopic sights heretofore used in our seacoast service have not been entirely satisfactory, due to a lack of proper illumination of the focal image. This lack of light is naturally seriously felt in the hazy or foggy weather which is so likely to occur on the seacoast.

90. In order to improve this feature of the telescopes there appeared to be no other remedy than to increase the diameter of the object glass to about 3 inches and, as this increased the weight of the telescope, to use stronger attachments and fastenings to insure its rigid attachment to the gun carriage.

91. The Department now has under manufacture several of these telescopic sights with increased diameter of objective which have excellent light-giving qualities and, it is hoped, will meet with favor in the service. In increasing the objective it was desirable to increase the magnifying power also, but at a sacrifice of field. In view of the open sights provided with these telescopic sights, it is thought that the small field will not be objectionable in consideration of their other excellent qualities.

92. These sights will have a 3-inch triple objective, 15-inch focal length, Brashear-Hastings erecting prisms, and two eye-pieces giving powers of 12 and 20 with a field of 4 degrees and 3 degrees, respectively. The eye end of the telescope will be provided with a rack and pinion for focusing, and with adjustable cross wires. Means have been provided for illuminating the scales at night; also for the illumination of the image, should this be found necessary. The deflection scale is

placed where it can be conveniently read, and is graduated to 0.05 degree, and to cover an arc of 2 degrees to the right and 2½ degrees to the left. All graduations are made on strips of German silver, and a range drum is attached which will be graduated for each particular gun at such time as the range scale for the gun is determined.

93. The following seacoast guns have been issued to the service during the year:

6-pounder R. F. guns.....	10
15-pounder R. F. guns.....	2
5-inch R. F. guns.....	15
6-inch R. F. guns.....	5
10-inch B. L. rifles.....	2
12-inch B. L. rifles.....	4
12-inch B. L. mortars.....	36
Total.....	74

94. The total number of guns which have been manufactured to date and have been issued or are available for issue to the fortifications is as follows:

6-pounder R. F. guns.....	70
15-pounder R. F. guns.....	119
4-inch R. F. guns.....	4
4.7-inch R. F. Armstrong guns.....	34
5-inch R. F. (Ordnance Department) guns.....	32
6-inch R. F. Armstrong guns.....	8
6-inch R. F. (Ordnance Department) guns.....	42
8-inch B. L. rifles.....	85
10-inch B. L. rifles.....	134
12-inch B. L. rifles.....	127
12-inch B. L. mortars.....	371
Total.....	1,025

95. The following seacoast gun carriages were completed by the close of the fiscal year ended June 30, 1903:

6-pounder parapet mount, model of 1898, Driggs-Seabury.....	70
15-pounder masking parapet mount, model of 1898, Driggs-Seabury.....	115
4-inch barbette carriage, Driggs-Schroeder.....	4
4.7-inch barbette carriage.....	^a 35
5-inch barbette carriage, model of 1896, Bal. Pil. Mt.....	32
6-inch barbette carriage, Armstrong.....	8
6-inch disappearing carriage, L. F., model of 1898.....	29
8-inch barbette carriage, model of 1892.....	^b 9
8-inch disappearing carriage, L. F., experimental.....	1
8-inch disappearing carriage, L. F., model of 1894.....	25
8-inch disappearing carriage, L. F., model of 1896.....	38
10-inch barbette carriage, model of 1893.....	11
10-inch disappearing carriage, experimental.....	^c 1
10-inch disappearing carriage, L. F., model of 1894.....	34
10-inch disappearing carriage, L. F., model of 1896.....	74
10-inch disappearing carriage, A. R. F., model of 1896.....	3
12-inch barbette carriage, model of 1892.....	28
12-inch gun-lift carriage.....	2
12-inch barbette carriage, altered gun lift.....	3
12-inch disappearing carriage, L. F., model of 1896.....	27
12-inch disappearing carriage, L. F., model of 1897.....	35
12-inch disappearing carriage, L. F., model of 1901.....	7
12-inch mortar carriage, model of 1891.....	^d 85
12-inch mortar carriage, model of 1896.....	^e 306

^a Includes one 4.7-inch Schneider carriage, temporarily mounted at Fort Hancock, New York Harbor.

^b One in storage.

^c In storage.

^d Four in storage. Digitized by Google

^e Ten in storage.

96. As stated in my last annual report, the heavy armament of the seacoast defenses of the United States is in a very satisfactory state of advancement, and I am not therefore submitting this year any estimates for forgings for heavy guns, and am contemplating building only two carriages for heavy guns, which are already in course of construction. The rapid-fire armament still needs to be pushed with energy. The practice which produces skill in the use of the armament has now an importance greater than that of new installation, and it is desirable that its encouragement shall continue. For the current year, practice with reduced charges has been abandoned, as not representing service conditions with sufficient accuracy; the appropriations for target practice have permitted this, and it is hoped that they will continue to do so.

97. A good start has been had in the manufacture of field material of the adopted model, and it is expected that most, if not all, of the batteries of the regular service will be armed with the new guns before the close of the present fiscal year; and that the armament of the militia will follow closely upon that of the regular batteries. The material under manufacture is, however, only sufficient for these two components of the service, and there should be no diminution in the rate of manufacture for several years to come, in order that a proper reserve for the armies necessary for time of war may be created. The Department is progressing more slowly with siege material than is desirable, but is working up to the limit of its resources in personnel. A plant able to turn out a small quantity of field ammunition is installed and is capable by the addition of machinery in buildings already available of expansion so as to be able to produce ammunition at a rate which may be regarded as reasonable. Estimates of the moderate size necessary for installing the machinery have been submitted. For the manufacture of small arms and equipments the plant in the possession of the Department is now good and will shortly reach a condition which can be regarded as quite satisfactory. In the meantime, these articles are being produced in considerable quantities, which are not only supplying current needs, but accumulating a reserve for the possible necessities of the future.

MAINTENANCE AND CARE OF THE ARMAMENT OF FORTIFICATIONS.

98. The division of the seacoast armament for maintenance and improvement into four districts, as stated in my last annual report, has been modified during the year to form another district, consisting of the armament on Sandy Hook, which has been placed in charge of the commanding officer of the Sandy Hook proving ground.

99. This system for the maintenance and care of the armament has proven so efficient, and has relieved this office of such an amount of unnecessary correspondence, which has heretofore caused annoying delays, that it has been extended to include field batteries in this country and the Philippines. Under the system, when the material of field batteries is in need of repairs requiring the services of skilled mechanics of the Ordnance Department, commanding officers of batteries are authorized, with the approval of post commanders, to communicate directly with designated officers of this Department, who have been instructed to furnish mechanics and material when neces-

sary. This system also contemplates the supplying of standard material upon requisition direct to designated officers of the Ordnance Department, without requiring the requisition to be forwarded to this office for approval.

100. The installation of the small machine shops at some of the principal seacoast fortifications, referred to in my last annual report, has progressed satisfactorily during the year and has resulted in an economical method of making repairs and alterations to the armament, without the delays heretofore experienced in the shipment of parts requiring machine work to the nearest arsenal.

DEFENSE OF INSULAR POSSESSIONS.

101. It is five years since this nation came into possession of Porto Rico, Guam, and the Philippine Islands, and up to the present time nothing has been done for the establishment of permanent defenses for their coasts and harbors. The general subject of the defense of these possessions, by all the means which might be devoted to it, is one which other branches of the Government besides this Department are concerned with, but it is proper here to make a brief statement of the relation which the permanent seacoast works of defense will bear to the general subject.

102. It may be, and probably is, true that permanent possession of the islands could not be maintained continuously against an enemy commanding the sea approaches thereto, but in the vicissitudes of war the contingency must be contemplated of a temporary loss of sea power in particular waters and the necessity recognized for providing against the occurrence of complete disaster during such interval. Political as well as military considerations, or even irresistible popular interference, might so control the motion of fleets as to disarrange the best laid plans for naval supremacy in given portions of the world; and in order to provide against the disastrous results from such very foreseeable accidents, it would seem the part of common prudence to provide works which should perform the well-understood office of fortifications—namely, to enable a smaller force to hold out against a larger one for a time. This time might be short, though invaluable, for such a small island as Guam, or one situated so near to our own coast as Porto Rico; but a territory as large as that comprised in the Philippine Archipelago, with all the resources which are to be found in those islands, might with the assistance of proper defenses for its important harbors be able to maintain itself, even, although cut off by sea, during the continuance of a short war. And if so defended, it would in any event compel for the hostile occupation of its principal centers the dispatch of a sea and land force of such magnitude as to consume a very considerable portion of the military energy of a possible enemy. Without fixed defenses it would be possible for a fleet to occupy a harbor and hold at its mercy a city, as did the American fleet with Manila in 1898. With them it would be necessary to send for the purpose an army to make a landing and operate against whatever troops there might be on shore and a superior fleet of war vessels to convoy the army to its landing point and protect its continuous stream of supplies.

103. Although it may be a question as to the extent to which the Philippine Islands themselves may be required to endure the expense

necessary for the maintenance of peace and security and civil order therein, it would seem undoubted that that which is due to their equipment as an outpost guarding the interests of the United States in the Far East should be borne by the General Government. Estimates for commencing the work of armament of seacoast fortifications therein will be submitted, which will be less in amount because of some useful guns already on hand and available.

ARMY AND NAVY MANEUVERS.

104. The maneuvers at Portland Harbor in August, 1903, developed few defects. The 12-inch mortars were provided with the new design of firing mechanism, and, except for a weakness in the slide latch and the absence of a stop to prevent the gunner accidentally raising the safety bar out of its seat, this design was generally satisfactory. Both of the defects mentioned above are being remedied.

105. The use of blank charges in heavy guns developed an unexpected difficulty, viz: The powder pressure is insufficient to operate the gas check pad. It results that the breechblock and its recess are covered with powder residue, which after a few rounds clogs the mechanism and brings such a load on the rotating and translating devices that the latter have "cut," in some cases sufficiently to render them unserviceable. It is possible that the use of blank charges in this class of gun will have to be discontinued.

106. Numerous failures of electric primers were reported during the target practice following the maneuvers, but in nearly every case it was found that the failure was due to faulty contact or connections, outside the primer.

107. A number of 15-pounder firing pins were broken in drills prior to the maneuvers. The use of an empty cartridge in the drill obviated this difficulty, but it appears that the pins should be strengthened and steps are now being taken to this end.

108. The serviceability of the seacoast mortar as demonstrated last year has been fully sustained in target practice since, especially in the considerable amount which was had at the maneuvers. Although originally intended for fixed targets only the practice is now conducted against moving targets with marked success.

109. Shipment of the large amount of ammunition required for the maneuvers and for the extensive target practice which followed them was commenced much earlier than for the maneuvers of last year, following the lesson learned on that occasion, and was accomplished in good time.

110. The maneuvers and accompanying target practice afford a spur to the equipment of the districts concerned, an excellent test of the material which has been installed, and the most useful practice which is had, both by the regular artillery and the militia participating. It is believed that they are worth their moderate cost.

PERSONNEL.

111. In my last annual report I invited attention to the difficulty which this Department was experiencing in filling vacancies among its officers. At that time there existed twelve of these vacancies for which there were no applicants. The cause of the difficulty was the

lack of inducement offered, under the law then existing, for officers to seek service in the Department. It was stated that it would be necessary either to lower the standard of the personnel or to increase the inducement.

112. In order to meet the situation, the House of Representatives placed in the bill making appropriation for the support of the Army legislation as follows:

And hereafter details for service in the Ordnance Department under the provisions of the act of February first, nineteen hundred and one, may be made, from the Army at large, from the grade in which the vacancy exists, or from the grade below: *Provided*, That no officer shall be so detailed except upon the recommendation of a board of officers serving in the Ordnance Department, senior to the eligible grade, and after at least one examination, which shall be open to competition: *And provided further*, That officers so detailed for service in the Ordnance Department in grades below that of lieutenant-colonel shall not be again eligible for such detail until after they shall have served for at least one year out of that Department.

This measure would have involved no special consideration for anybody whatever; it would have invaded no privilege or prerogative, and it would have entailed no increase of expense. It is believed that it would have effectively accomplished its purpose, but it was changed in the Senate so as to limit the grades in this Department which could be filled by detail from the grade below in the Army at large to that of first lieutenant, and to strike out the provision reducing the present interval of two years which is required between successive details in the Ordnance Department to one year; and as thus changed it became a law. Being but a partial measure of relief it had only partial effect; all advancement from service in the Ordnance Department would cease after an officer should have passed the grade of second lieutenant, and the two-year interval still prevents the following of the profession of constructor of ordnance as the officer's life work. For the 14 vacancies to which the number in the Department had grown in the meantime there were, after the passage of the act, 10 applicants; all of these were examined, and 3 were detailed for duty in the Department. The shortage has in the meantime increased to 19, of which 17 arise from natural depletion and 2 by the detail of officers of the Department in the General Staff. This number is a ruinous proportion in a busy corps of only 71 authorized officers.

It is evident that the inducements have not been sufficiently increased to tempt officers, of whom there is an abundance in the service capable of meeting the requirements, to prepare themselves for the examination, which, to be discriminating and effective, must be difficult, and to undertake the laborious duty which would be incident upon success. The subject, in that it affects all the work of this department, is the most important one before it. It is necessary that experts be trained in the special branch of mechanical engineering which constitutes the work of the department. If they can not be induced to take up the work in the service, such policy with relation to private manufacturers must be adopted as will make it worth their while to train a designing staff properly equipped to meet the necessities of the Government, or high-priced civilian engineers must be employed. The Ordnance Department is not now meeting these necessities, in that progressive production of new designs is lagging, and is not properly fulfilling the purpose for which it is maintained. The discussion of the situation which I presented in my last annual report set forth the needs of the department, and the considerations in support of the method by

which I thought that they should be met, as strongly as I am able to put them. Since that time the conditions have changed only in being accentuated. Without repeating here that which was said fully at that time, I will quote the final words upon the subject, which describe the situation as it stands to-day:

An honest effort has been made to supply the Ordnance Department with proper officers under existing law. The effort has failed, and something else must be tried. The personnel of the arsenals has been reduced to the smallest number of officers which can carry on the administration of the business which is conducted at them, the details of which form the daily work which is imperative and to which that of possibly higher class must yield. As has appeared above, needed designs are not in progress for lack of officers, of whom there should be many more working upon problems of ordnance development. More vacancies will shortly be created in the department. They can be speedily and advantageously filled by holding out something to the eligible body of officers, which contains abundant talent. This subject has been dealt with at much length, because we can not afford to wait for the demonstration—in discovery in the time of need of the inadequacy of material produced during the period of preparation—of the reduced efficiency of the department charged with the production of the most expensive and most characteristic of war supplies. There being no immediate penalty for being wrong either in making poor recommendations or in failure of action upon good ones that sense of responsibility which recognizes the liability to be called to account is apt to be inactive, and needs the reinforcement of careful discussion.

ISSUES TO THE MILITIA.

113. There are now three laws under which issues are made to the militia: Paragraph 1661 of the Revised Statutes as amended; the act to promote the efficiency of the militia, and for other purposes, approved January 21, 1903, and the act making appropriations for the support of the Army, approved March 2, 1903.

114. The act of January 21, 1903, provided as follows:

SEC. 13. That the Secretary of War is hereby authorized to issue, on the requisitions of the governors of the several States and Territories, or of the commanding general of the militia of the District of Columbia, such number of the United States standard service magazine arms, with bayonets, bayonet scabbards, gun slings, belts, and such other necessary accouterments and equipments as are required for the Army of the United States, for arming all of the organized militia in said States and Territories and District of Columbia, without charging the cost or value thereof, or any which have been issued since December first, nineteen hundred and one, or any expense connected therewith, against the allotment to said State, Territory, or District of Columbia, out of the annual appropriation provided by section sixteen hundred and sixty-one of the Revised Statutes, as amended, or requiring payment therefor, and to exchange, without receiving any money credit therefor, ammunition, or parts thereof, suitable to the new arms, round for round, for corresponding ammunition suitable to the old arms theretofore issued to said State, Territory, or District by the United States: *Provided*, That said rifles and carbines and other property shall be receipted for and shall remain the property of the United States and be annually accounted for by the governors of the States and Territories as now required by law, and that each State, Territory, and District shall, on receipt of the new arms, turn in to the Ordnance Department of the United States Army, without receiving any money credit therefor, and without expense for transportation, all United States rifles and carbines now in its possession.

To provide means to carry into effect the provisions of this section, the necessary money to cover the cost of exchanging or issuing the new arms, accouterments, equipments, and ammunition to be exchanged or issued hereunder is hereby appropriated out of any moneys in the Treasury not otherwise appropriated.

115. There were issued to the militia between the date December 1, 1901, and that of the passage of the above-mentioned act arms and equipments covered by the section quoted to the amount of \$153,723.74, which had been charged to the quotas of the several

States and Territories under paragraph 1661 of the Revised Statutes. This amount has been refunded to the appropriation for arming and equipping the militia from the United States Treasury.

116. During the time necessarily occupied in securing information required for putting into effect the act of January 21, 1903, there were issued to six different States, the Territory of Arizona, and the District of Columbia material covered by the act to the amount of \$183,169.85, which sum was charged to the quotas of the several States under paragraph 1661 of the Revised Statutes. This amount has also been refunded to the quotas of the States from the United States Treasury.

117. Under this act there have been issued to the militia free of charge a total number of 69,063 magazine rifles and 3,605 carbines, with accompanying accouterments and equipments, the whole aggregating in value \$1,269,488.06. The work of issuing this large amount of stores and of collecting and arranging the information necessary for presentation to the Treasury Department, in order to procure the settlement of accounts for refundment to the appropriation for arming and equipping the militia, has thrown a considerable burden on the clerical force of this office; but it has been performed in such manner as to insure the least possible delay in supplying the militia with the stores to which they became entitled under the act.

118. The act of March 2, 1903, provides as follows:

That for the purpose of furnishing the necessary articles requisite to fully arm, equip, and supply each regiment, battalion, squadron, company, troop, battery, signal, engineer, and hospital corps and medical department of the organized militia of the several States, Territories, and the District of Columbia with the same armament and equipment as are now prescribed for corresponding branches of the line or staff in the Regular Army, without cost to said States, Territories, or the District of Columbia, but to remain the property of the United States, and to be accounted for in the manner now prescribed by law, the Secretary of War is hereby authorized, under such regulations as he may prescribe, on the requisitions of the governors of the several States and Territories, or the commanding general of the militia of the District of Columbia, to issue the said armament and equipment to the organized militia; and the sum of two million dollars is hereby appropriated and made immediately available until expended for the procurement and issue of the articles constituting the same.

119. Of the \$2,000,000 appropriated, \$700,000 have been allotted by the Secretary of War for the procurement of field material of the newly adopted model for issue to the militia in order to carry out the provision of the law that the armament of these troops shall be in all respects the same as that of the Regular Army. This amount is enough to procure sixteen batteries, and it is hoped that most of these will be in the possession of the militia before the end of the present fiscal year.

WATERVLIIET ARSENAL.

120. This arsenal was commanded from the beginning of the fiscal year until February 18, 1903, by Col. J. P. Farley, Ordnance Department. Upon that date Colonel Farley was appointed a brigadier-general, United States Army, and was subsequently retired from active service in accordance with the law. From that date until the end of the fiscal year the arsenal was commanded by Lieut. Col. Charles Shaler, Ordnance Department.

SEACOAST GUN SHOPS.

121. *5-inch R. F. guns, model of 1900.*—The manufacture of 21 of these guns was undertaken during the year. The progress to June 30, 1903, is equivalent to 1.56 completed guns. The mechanism for these is the same as for the 6-inch R. F. guns, model of 1900.

122. *6-inch R. F. guns, model of 1900.*—Of the 46 reported in progress last year, 30 were completed June 30, 1903, and the remainder were about 88 per cent completed. The firing mechanism under test at the time of the last report has since been adopted for these guns and for the 5-inch guns above.

123. *8-inch B. L. rifles, model of 1888, MII.*—Four of these guns, ordered to replace a similar number lost at sea, have been completed.

124. *10-inch B. L. rifles, model of 1895, MI.*—The manufacture of the last order of 12 of these guns has been completed, the work during the year being equivalent to 1.04 guns.

125. *10-inch B. L. rifles, model of 1900.*—Fourteen of these are under manufacture, the work during the year being equivalent to 3.87 guns. The entire order will be completed within the present year.

126. *12-inch B. L. rifles, model of 1895, MI.*—The last order for 18 has been completed, the work during the year being equivalent to 2.10 guns.

127. *12-inch B. L. rifles, model of 1900.*—Of the 12 guns of this model under manufacture at last report 4 have been completed, the work during the year being equivalent to 5.97 guns.

128. *12-inch B. L. mortars, model of 1890, MI.*—Of the 40 reported under manufacture last year all but 3 were completed June 30, 1903, and these 3 were 97 per cent completed.

129. Besides this regular work there have been manufactured about 4,130 spare parts of various kinds for the different guns.

SMALL GUN SHOP.

130. *Ninety 2.95-inch (75 millimeter) Vickers-Maxim mountain guns.*—Only 6 of these were completed June 30, 1903, owing to the delay in receiving the necessary forgings. This delay has also increased somewhat the cost of manufacture.

131. *Seven-inch howitzer, model of 1898.*—Twenty-four of these have been completed and shipped to the proving ground for proof. They are equipped with the latest form of firing mechanism.

132. *Five-inch siege rifles, model 1898, MII.*—Ten of these equipped with the latest firing mechanism have been completed and shipped to the proving ground.

133. *Eighty-two 3-inch field guns, nickel steel, model of 1902.*—Satisfactory steel for these guns is being procured with difficulty. Although the first order was given for the steel early in December, 1902, up to June 30, 1903, but 11 tubes, 6 jackets, 14 locking hoops, 43 breech-blocks, and 43 muzzle clips were delivered, and of these several have since been rejected for defects developed in machining.

134. One 3-inch and two 3.2-inch field-gun mechanisms have been altered to receive experimental eccentric firing mechanisms. Also one experimental 3-inch field gun with Stockett eccentric mechanism has been completed. This gun is also provided with a separate breech-block fitted with the Tasker continuous-pull firing lock. All of these devices will be tested in the near future.

135. *Metallic models.*—Sixteen models of the different service guns have been completed, and also one working model has been completed, and 15 similar models are under construction.

MACHINES INSTALLED.

136. The manufacture of new firing mechanisms for all seacoast guns as well as spare parts necessary to keep the large armament in serviceable condition has required the purchase and installation of a number of small machines in which this arsenal was previously very deficient.

CAPPING AND GROOVING ARMOR-PIERCING PROJECTILES.

137. About 706 steel projectiles of various calibers are being capped for armor-piercing and grooved for base covers, of which 111 were completed June 30, 1903.

GAS-CHECK PADS.

138. Experimental pads have been manufactured and tested in which it is sought to obviate the difficulty experienced in service during fire due to the melting and softening of the pad material under the influence of heat. In one type the exposed edge (periphery) of the pad is protected by a copper covering; in another, the thickness of the pad is reduced so as to present a much smaller exposed surface. The latter type necessitates changes in the filling in disk and rear split ring. Both types have given good results in firing tests at the Sandy Hook proving ground.

139. Experiments have also been made with oleo stearin as a substitute for tallow in the pad composition. The results were so favorable, as regards absorption of moisture, that a number of pads having oleo stearin substituted for tallow and waterproofed with oleo stearin and also some pads with the usual pad composition waterproofed with oleo stearin have been manufactured and sent to the Sandy Hook proving ground for test.

HIGH-SPEED TOOL STEELS.

140. Tests of various steels of this class were conducted during the year.

141. Thus far the best results have been obtained with Novo, Ideal, Blue Chip, Midvale Special, and Rex.

142. The usual cutting speed for rough turning and boring oil-tempered forgings has been about 8 feet a minute, with a feed of 0.08 of an inch in turning and 0.03 in boring, the depth of the cut varying according to the amount of metal to be removed.

143. With high-speed tools now in use the cutting speed for rough boring has been increased to from 15 to 18 feet a minute, and for rough turning to from 18 to 26 feet a minute, the feed remaining the same, and it has been found that even with these speeds the tools do not require regrinding as often as formerly. The adoption of high-speed tool steel has, therefore, resulted in a material saving of time and expense in the machining of all sizes of gun forgings, but it is greater in the case of large forgings, where the time of setting forms a smaller, and the actual cutting time forms a larger, percentage of the

total time required to finish the piece. In the case of small pieces the average saving amounts to from 10 to 20 per cent, and in large forgings from 20 to 40 per cent.

144. A further saving is made in the case of the larger calibers of guns by turning the outside while finish-boring is in progress. This was impossible formerly, since the rate of rotating of the gun required to obtain a proper boring speed gave a turning speed which was beyond the capacity of the tools.

145. Very good results have been obtained with these steels in finish-turning the outside surfaces of guns, but a satisfactory shrinkage surface can not be obtained with a cutting speed greatly above that at which tempering tools may be run.

146. Owing to the high first cost of this steel, the savings resulting from its use will not be apparent until the shops are completely supplied with tools made of it, but in the long run material economies will result.

WATERTOWN ARSENAL.

147. The principal operations at this arsenal during the year have comprised the manufacture and issue of a large amount of stores to the Army, more especially those connected with the armament of fortifications. The arsenal, besides being the principal carriage manufactory of the Department, is also the central supply station upon which requisitions are made by armament officers for spare parts and for parts of the armament requiring alteration. The various shops have been employed in this work to practically their full capacity.

148. Considerable delay has been experienced by the Department in procuring material for the manufacture of carriages, especially in the procuring of steel castings. Although effort has been made to save time by dividing the manufacture of patterns among several places, the manufacturers of steel castings have been so much occupied with commercial orders during the past year or two as to have been unable to fulfill their obligations to the Department. This lack of ability to procure steel castings, especially for repairs, and the delay incident thereto, has caused the Department to take measures to install a small steel casting plant of about 2 tons capacity at this arsenal, which, it is hoped, will be in running order during the early part of the next fiscal year. The ability to manufacture small steel castings will enable the Department to make repairs and alterations to carriages much more economically and expeditiously than it has been able to do heretofore.

149. The following carriages have been completed during the year, viz: One 12-inch barbette carriage, model of 1892; 1 mount for 16-inch B. L. rifle (for proof purposes); 6 carriages for Vicker's Sons & Maxim 75 millimeter mountain gun; 34 carriages for Vicker's Sons & Maxim mountain gun (except buffer springs).

150. Work is now in progress on other carriages as follows, viz: One 16-inch Buffington depressing carriage; four 12-inch disappearing carriages, L. F., model of 1901; eight 10-inch disappearing carriages, L. F., model of 1901; sixteen 6-inch barbette carriages, model of 1900; 50 carriages for Vicker's Sons & Maxim mountain gun.

151. There have been no enlargements of the shops during the year, but their capacity has been slightly increased by the installation of a few new machines. The electric transmission of power recently

installed has been satisfactory and has led to the consideration of the propriety of equipping some of the large machines with individual motors.

152. Various experiments, with cast-iron dummy projectiles, have been carried on at this arsenal, where they are also manufactured. It having been found that the dummy projectile of the original design damaged the rifling by repeated ramming over the chamber slope a new design was adopted having a front band of bronze, and with the cylindrical iron body of the projectile slightly reduced in diameter, so as to keep it away from the slope entirely.

153. The experimental penthouse to cover a 12-inch gun on disappearing carriage at Fort Williams, Me., has been completed during the year and will be erected after the close of the present drill season for experiment and observation.

154. The construction of the new barracks building referred to in my last annual report has been delayed somewhat by strikes and bad weather. It is probable, however, that the building will be completed within the time agreed upon in the contract.

155. The testing department has been occupied with material representing the current work of this arsenal and manufacturing establishments engaged upon work for the Department. These tests are directed chiefly toward the determination of the physical properties essential for the acceptance of material in accordance with specifications.

156. Respecting investigations of the relative properties of carbon and nickel steels, current statements have met with further confirmation in the present series of tests—i. e., that higher elastic limit and tensile strength, accompanied by toughness, result from the addition of nickel to the metal. Under repeated alternate stresses of tension and compression the two steels behave in a similar manner, and ultimate rupture may be accomplished in each without the display of sensible elongation or contraction of area. The properties of a given steel are so modified by heat and mechanical treatment that special attention has been given metal as found in its natural state in the ingot. In these tests attention has been directed to local spots of weakness which, in the specimens thus far tested, have been more frequently encountered in nickel steel than in carbon steel. These local defects appear, after the metal has been ruptured, as bands or streaks of light-colored metal with smooth, splendid surfaces. Their presence has not been explained, nor has any difference in the structure or chemical composition been accounted for. So far as known, heat treatment of the metal by annealing at a suitable temperature, while improving the metal as a whole, does not modify the deleterious influence of these local defects.

157. Investigations and tests of cement and concrete have been continued and the results obtained are believed to possess a general engineering interest. Some interesting tests have been made with neat cement and cement mortar, the latter having a composition of one part of cement and one part of sand, in which the material was set under pressure immediately after gauging. The neat cement specimens at an age of one month displayed a compressive strength of 19,150 pounds per square inch, the average strength of granite, and the mortar specimen at the same age 14,020 pounds per square inch. During the early stages of induration, and while in the molds, the material was

placed under an initial pressure of about 14,000 pounds per square inch, after the release of which the specimens set in water until tested.

ROCK ISLAND ARSENAL.

158. No advantage has as yet been taken of the revocable license granted by the honorable the Secretary of War near the close of the last fiscal year to the town of Moline, to construct and maintain a water main and settling basin at the northeast end of the island, for the reason, stated by the mayor, that the city has not available funds to meet the expense of the work. A desire has been expressed that the license be continued in force until such time as the city's finances will permit the prosecution of the work.

159. During the past year the number of employees at this arsenal has varied from 1,300 to 1,500, and with the present demand for equipments of various kinds, and the work on the new material for field batteries, etc., it is probable that the plant will be operated for a few years at least upon the present scale. In addition, for the operation of the small-arms plant now installed and for which only special tools, gauges, fixtures, etc., are required, it will be necessary, before the close of the coming fiscal year, in the manufacture of the magazine rifles, model of 1903, to add several hundred employees to the present working force.

160. I invited attention in my last annual report to the lack of a sufficient number of assistant officers to properly supervise the varied operations of the arsenal, and this will be more severely felt when the small-arms plant is in operation.

161. Several of the shops which have been heretofore used for the storage of field and siege guns, carriages and limbers, and obsolete stores have been utilized for machines for small-arms manufacture, resulting in a lack of space for the proper and convenient storage of the output of the arsenal's carriage department. As soon as the issue of the new field material is commenced the old material in service will be turned in for repairs and storage and will form an excellent reserve supply available for sudden demand. At present there is no suitable place for the storage of this equipment, and the necessity for an artillery store-shed is apparent. Such a building was included in the plans of the arsenal, and estimates for it have frequently been submitted. The desired building has been planned harmonious with adjacent structures, and an estimate for its construction is again submitted.

162. Attention is again invited to the lack of a suitable building for a hospital. The building which has been used for many years is an old frame structure, originally a temporary erection during the civil war. It is entirely unfit for the purpose, and its condition has been reported by the inspector-general of the district in which Rock Island is situated as utterly unfit for hospital purposes and not worth repairing. Estimates have been repeatedly submitted and are again included this year for a new building which is so urgently needed.

163. On the night of February 11, 1903, the building known as "Storehouse A," with its contents, was entirely destroyed by fire. It is gratifying to state that Congress at its last session appropriated funds for rebuilding the storehouse and for replacing the stores destroyed.

164. *Development and transmission of power.*—To furnish sufficient power for the machines added during the year, and also for the operation of the small-arms plant, the power house has been extended to provide accommodations for six additional turbines and one 650-kilo-watt generator, conforming to those now in operation. These are now being installed, and when completed will give the arsenal from 2,200 to 2,300 horsepower, depending upon the stage of the water.

165. *Installation of machinery.*—The facilities of the arsenal have been increased during the year by the addition of a number of new tools, many of which were required for the better equipment of the machine shops in preparation for the manufacture of field and siege carriages, limbers, and caissons. Electric welding machines are used in the equipment shop and have greatly improved, expedited, and cheapened a number of operations. A hydraulic plant for the formation by pressure of parts of gun carriages is now being installed, consisting of three presses of 275, 900, and 2,000 tons capacity, respectively. When completed the former method of doing this work with heavy drop hammers will be discontinued.

166. *Small-arms plant.*—The machinery required for the manufacture of small arms, consisting of 1,074 machines, is now in place and will be ready for operation as soon as necessary tools and fixtures can be provided. Considering the time that must necessarily elapse before the fixtures and gauges can be prepared and a suitable working force assembled, organized, and properly instructed, it is not anticipated that a large output of small arms from this arsenal can be expected before the latter part of the present fiscal year.

167. Owing to the large amount of work at Watertown Arsenal, the department found it desirable to manufacture a number of 6-inch barbette carriages, model of 1900, at Rock Island Arsenal. The completion of the work on this material has been delayed, owing to slowness in delivery and imperfections in many of the steel castings.

168. Equipments made of stuffed russet leather have proved generally satisfactory, though some criticism has been made, based upon the fact that the oil soils the clothing. This subject has been discussed with the leather contractors and assurance has been given that the amount of "dubbing" will be limited to that absolutely necessary to produce the desired durability. This is by no means easy of attainment, but the firm which has been supplying the leather is one of the leading manufacturers of the country, and it is expected that success will finally be attained.

169. The total cost of the plant at Rock Island to date is as follows:

Cost of buildings, water power, machinery, etc., at Rock Island Arsenal from its establishment to June 30, 1903.

Commanding officers.	Period.	Construction, repair, and preservation of buildings, roads, sewers, etc.	Construction, repair, and preservation of bridges.	Rock Island water power.	Machinery and shop fixtures.	Total.
Maj. C. P. Kingsbury ..	1863-1865	\$231,384.72				\$231,384.72
Gen. T. J. Rodman	1865-1871	1,856,456.62	\$6,664.33	\$440,506.36		2,302,626.30
Gen. D. W. Flagler	1871-1886	4,137,675.24	160,894.74	591,911.47	\$92,000.00	4,982,481.45
Col. T. G. Baylor	1886-1889	201,200.00	96,250.00	322,000.00	44,000.00	663,450.00
Col. J. M. Whittemore ..	1889-1892	69,000.00	182,318.48	101,000.00	25,000.00	377,318.48
Gen. A. R. Buffington ..	1892-1897	47,250.00	315,125.50	67,500.00	47,500.00	477,375.50
Maj. S. E. Blunt	1897-1903	161,935.10	36,119.61	252,556.00	874,536.60	1,325,147.31
Total.....		6,703,960.68	797,372.66	1,775,473.82	1,088,036.60	10,365,783.76

ORDNANCE BOARD.

170. *Membership*.—July 1, 1902, to July 1, 1903, Maj. R. Birnie, Ordnance Department; Capt. B. W. Dunn, Ordnance Department.

July 1, 1902, to August 31, 1902, Maj. O. B. Mitcham, Ordnance Department.

July 1, 1902, to November 1, 1902, Capt. E. B. Babbitt, Ordnance Department.

November 1, 1902, to July 1, 1903, Lieut. Col. Charles S. Smith, Ordnance Department.

November 17, 1902, to July 1, 1903, Maj. M. M. Macomb, Artillery Corps.

171. The following is a list of subjects reported upon by the board during the year ended June 30, 1903:

Reference file number.	Subject.	Date of report.	Nature of report.
	<i>Guns.</i>		
34795.....	37-mm Vicker-Maxim automatic gun, field equipment.	Sept. 24, 1902	Test completed. Similar gun, with mountain equipment, recommended for trial.
22396.....	Programme for test of 1-pounder automatic guns, for Board of Ordnance and Fortifications.	June 22, 1903.....	Programme forwarded.
36292.....	Ehrhardt 2-inch field gun and carriage, with high-explosive shell.	June 23, 1903.....	Programme for trial submitted.
25646.....	3-inch mountain gun and carriage, Bethlehem Steel Co.	Jan. 27, 1903	Trials not satisfactory.
36264.....	do	Mar. 3, 1903.....	Do.
26264.....	3-inch mountain gun, jointed construction. Designed by Bethlehem Steel Co.	Jan. 27, 1903; Feb. 21, 1903.	Not recommended, pending reports on service material.
	Types of mountain guns for service.	Jan. 27, 1903	Questions proposed for answer by officers who have served with mountain batteries.
31149.....	Pack outfit for 3-inch mountain guns in service.	Jan. 5, 1903.....	Defects considered. Recommended to convene special board.
38182.....	do	Apr. 9, 1903.....	Comments on report of battery officers.
36989.....	do	Apr. 16, 1903.....	Comments on report of commanding officer, ordnance depot, Manila, P. I.
25524.....	Test of 3-inch B. L. field guns and carriages for selection of service type.	July 16-23, 1902 ...	Weekly progress reports.
	Do.....	Aug. 21, 1902; Oct. 20, 1902.	Test completed. Two of the systems, namely, the Ehrhardt and O. D. long recoil, passed the trials without serious breakage or injury. Star gauge records.
36292.....	Ehrhardt 3-inch field gun No. 5, model 1902, with sliding block.	May 12, 1903	Test completed. Generally satisfactory.
37977.....	15-pounder gun and mount, barrette, model 1902, Bethlehem Steel Co.	June 30, 1903.....	Programme for test of type gun forwarded.
13738.....	5-inch R. F. gun, modified firing mechanism, with automatic ejector.	Oct. 3, 1902	Tested. Not recommended.
13738.....	5-inch R. F. gun No. 18; automatic breech opening. Bethlehem Steel Co.	June 23, 1903.....	Progress report. Material returned to company for repair.
37724.....	do	Oct. 1, 1902	Generally descriptive report. Trials satisfactory.
24802.....	6-inch Bofors R. F. gun and mount.	Nov. 18, 1902	Features of special merit.
	do	Feb. 12, 1903.....	Preliminary trials of new firing mechanism adapted to service combination; electric friction primers.
	do	May 19, 1903	Preliminary report of trial by excessive pressures.
25587.....	6-inch Vickers-Maxim R. F. gun and mount.	Jan. 28, 1903.....	Test completed. Generally satisfactory.

Reference file number.	Subject.	Date of report.	Nature of report.
<i>Guns—Continued.</i>			
36862.....	6-inch firing mechanism, model 1900. Design Aug. 27, 1902.	Aug. 27, 1902	Design.
.....do .....	.....do	Mar. 18, 1903	Tested. Recommended with modifications.
.....do .....	.....do	Apr. 7, 1903.....	Action on proposed modifications.
.....do .....	.....do	June 13, 1903.....	Changes noted in sample made for 6-inch R. F. gun No. 1. model 1900.
36862.....	Firing mechanism for 12-inch B. L. rifle, model 1900.	Sept. 17, 1902.....	Trial of Ordnance Office and Watervliet Arsenal designs. New design recommended.
36862.....	12-inch firing mechanism, model 1900. Design Aug. 27, 1902.	Jan. 23, 1903	Progress report. Mechanism damaged by breaking of spindle.
.....do .....	.....do	Apr. 7, 1903	Trials completed. Not recommended.
11381.....	Firing mechanism for 8, 10, and 12 inch rifles and 12-inch mortar, Horney design.	Jan. 16, 1903	Tested on 8-inch rifle and 12-inch mortar. Changes recommended.
.....do .....	.....do	May 5, 1903	Trial of first and second patterns on 8, 10, and 12 inch guns and 12-inch mortar. Satisfactory, with changes recommended.
.....do .....	.....do	May 18, 1903	Trial of firing test, with outside contact springs recommended.
2802.....	Amended programme for test of 10-inch Brown segmental tube wire gun.	June 1, 1903.....	Programme for test of 100 rounds submitted.
18849.....	16-inch B. L. rifle, type, model 1896. Proof of gun and powder.	Mar. 17, 1903	Progress report. Material satisfactory.
11381.....	Experimental gas-check pads for seacoast rifles, caliber 5 to 12 inch, inclusive.	Dec. 29, 1902.....	5 patterns tested in 12-inch rifle. Further trials recommended.
.....do .....	.....do	June 2, 1903.....	Trials of pad wholly covered with copper not satisfactory. Use of 2 cups recommended.
36862.....	Double and triple worm for breech mechanism 12-inch B. L. rifle, model 1900.	June 4, 1902.....	Test satisfactory.
<i>Carriages.</i>			
38020.....	Recoil spade for 3.2-inch field carriage, W. S. Isham.	Feb. 3, 1903.....	Firings for adjustment.
6159.....	Experimental carriage for 5-inch field howitzer, model 1900.	Nov. 8, 1902	Tested. Important modifications needed.
6159.....	Emergency platform for 7-inch howitzer carriage, 1899.	Apr. 22, 1903.....	Test satisfactory with minor changes.
37198.....	Test of 12 inch disappearing carriage, L. F., model 1901, No. 8.	July 17, 1902	Programme of test submitted.
.....do .....	.....do	Apr. 11, 1903	Fired 7 rounds. Diagrams of pressure in recoil cylinders.
.....do .....	.....do	June 16, 1903.....	Counterbalance device tested.
.....do .....	.....do	June 18, 1903.....	Pistol-firing attachment tested.
.....do .....	.....do	June 29, 1903.....	Controller stops tested.
17173.....	Test of 8, 10, and 12-inch disappearing carriage for 1,800 foot-seconds muzzle velocity.	Oct. 13, 1903.....	Test completed, except for 8-inch carriage, model 1896.
37514.....	Pointer for elevation indicator drum for seacoast carriages.	Mar. 18, 1903	Opinion of design unfavorable.
37438.....	12-inch B. L. mortar carriage, model 1896.	Oct. 20, 1902.....	Damages due to firing at 70° elevation.
34348.....	.....do	Nov. 19, 1902.....	Modifications to facilitate aiming. Letter C. O., Watertown Arsenal, Sept. 26, 1902.
22563.....	.....do	Mar. 18, 1903	Changes proposed. Letter Lieut. C. L. Lanham, Fort Monroe, Va., Nov. 29, 1902.
38303.....	12-inch B. L. mortar carriage, model 1896.	May 1, 1903	Changes proposed for remodeling the carriage.
34348.....	Special quadrants for 12-inch mortar carriage.	Dec. 20, 1902, Jan. 27, 1903.	Two designs for quadrant fixed on rimbase of mortar.
37469.....	.....do	Apr. 22, 1903.....	Design proposed by Capt. S. F. Bottoms. Construction not recommended.
37514.....	Elevation device for 12-inch mortar carriage suggested by Maj. G. N. Whistler.	Jan. 8, 1902.....	Original design not recommended.
30160.....	.....do	Mar. 18, 1903	Revised design completed.

Reference file number.	Subject.	Date of report.	Nature of report.
<i>Carriages—Continued.</i>			
22653.....	Graduated wheel on elevating shaft proposed by Lieut. C. G. Rorebeck.	Aug. 27, 1902.....	Revised design completed.
23056.....	Movement in azimuth 12-inch mortar carriage due to firing.	May 23, 1903	Results of firing tests.
<i>Ammunition and target practice.</i>			
24493.....	Smokeless powder and range firings for 12-inch B. L. mortars.	Sept. 19, 1902.....	Progress report. Trial of wood cylinders for reduced charges. Not satisfactory.
37438.....	do	June 23, 1903	Progress of the work.
37438.....	Saluting charges for R. F. guns—short cartridge cases.	Oct. 23, 1902	6 and 15 pounder charges satisfactory.
37438.....	do	Mar. 13, 1903.....	Successful trial of 4.7 and 6 inch charges at Fort Wadsworth.
25284 D.....	Samples of smokeless powder, 3-inch field gun, chamber capacity 66.5 cubic inches.	Feb. 11, 27, 1903...	Tests completed.
37438.....	Charges of smokeless powder for 8, 10, and 12 inch guns—1,300 foot-seconds velocity.	Aug. 22, 1902	} Progress report. Tests completed.
		Dec. 6, 1902	
		Dec. 15, 1902	
37516.....	Test smokeless powders for critical point of pressure and retest lots over one year in store.	Feb. 5, 1903	Programme submitted.
		May 6, 1903	Progress report.
23565.....	Temperature tests of smokeless powders.	May 18, 1903	Tests of 5 and 12 inch powder proposed preliminary to further trials.
17173.....	Ballistic coefficient for 8-inch solid cast-iron projectile, pattern of 1897.	June 13, 1903	Value determined by firing for terminal velocities.
80916.....	Drill cartridges for 6-pounder guns.	Sept. 23, 1902	Head to be made of bronze.
37438.....	Dummy cartridges for drill	Nov. 22, 1902	Revised dimensions.
<i>Projectiles.</i>			
18805.....	1-pounder steel shell (maximum capacity) and fuse for subcaliber tube.	Sept. 15, 1902	Tests completed. Shell and fuse satisfactory.
23100.....	High-explosive shell for 75-mm. Vickers-Maxim mountain gun.	Feb. 11, 1903.....	Design completed.
23100.....	Steel shell for high-explosive 3-inch field gun.	Nov. 4, 1902	Drawings and specifications forwarded.
38239.....	15-pounder R. F. steel shell.....	Apr. 30, 1903.....	To be adopted for high explosive charge.
23100.....	5 and 7 inch steel (siege guns) for high explosive.	Mar. 31, 1903	Firing tests. Retention of base fuse recommended.
23100.....	Base covers for projectiles charged with high explosive.	Jan. 2, 1903	Change in thickness for small caliber projectiles.
24802.....	Bofors 6-inch A. P. shot and shell..	Apr. 2, 1903.....	Tests completed; fairly satisfactory.
36885.....	Form of screw thread for base plug of A. P. projectiles.	Sept. 12, 23, 1902 ..	United States standard or Whitworth recommended.
37514.....	Steel caps for 12-inch D. P. shell...	Aug. 21, 1902	Recommended for D. P. but not for torpedo shell.
37438.....	Weights of cast-iron projectiles for practice.	Jan. 22, 26, 1903....	Weights to be the same as steel projectiles.
30916.....	Dummy projectiles for drill.....	July 18 Sept. 12, 1902.	Bevel rear of band to prevent catching on loading tray.
	Dummy projectiles, bronze covered.	Apr. 3, May 5, 1903.	2 10-inch projectiles tested. Satisfactory.
32366.....	Isham 12-inch dummy shell.....	Oct. 15, 1902.....	Test completed.
32366.....	Isham 12-inch high-explosive shell.	Feb. 2, 1903.....	At second round shell burst in bore and destroyed 12-inch rifle.
36388.....	Double-charged shell, I. S. Scott ..	July 18, 1902	Design unsatisfactory.
37766.....	Dynamite projectile.....	July 25 Sept. 13, 1902.	Do.
37780.....	Gun and cartridge, M. M. Stasney.	July 29, 1902	Do.
37709.....	Rudder projectile, William Symons	Aug. 21, 1902	Do.
37098.....	Armor-piercing projectile, R. T. Yardley.	Sept. 13, 1902	Do.
37895.....	Projectile designed to prevent deflection on water, M. A. Van Buskirk.	.....do	Not needed in service.
37974.....	Armor-piercing projectile. Maj. E. T. Richmond.	Oct. 9, 1902	Inferior to service patterns.
38218.....	Explosive shell. T. W. Fowler...	Feb. 26, 1903	Design unsatisfactory.
34598.....	6-inch A. P. shell. Firth-Sterling Steel Co.	Nov. 18 Dec. 3, 1902.	Form of cavity and base plug.
37227.....	Unhardened steel shell. E. A. Hadfield.	Jan. 21, 1903	Design unsatisfactory.

Reference file number.	Subject.	Date of report.	Nature of report.
<i>Fuses and primers.</i>			
23100.....	F. A. base percussion fuse.....	Mar. 25, 1903.....	Résumé of tests to date.
23100.....	Merriam base percussion fuse.....	Dec. 5, 1902.....	Trials of fuse with delay action recommended.
30024-BBB..	15 and 28 seconds combination fuse modified to improve uniformity of burning in flight.	Sept. 17, 1902; Mar. 31, 1903.	Tests not satisfactory.
29020.....	Specifications for Krupp combination fuse.	Jan. 15, 1903.....	Tests recommended.
35999.....	F. A. experimental 20 seconds combination fuse.	June 3, 1903.....	Specifications revised.
33990.....	Detonating fuse for field shell.....	Mar. 19, 1903.....	Tests completed. Not satisfactory.
23100.....	Detonating fuse for siege and seacoast service.	Dec. 6, 1902.....	Trials of time fuse discontinued.
23100.....	do.....	do.....	Reassignment of Pierce fuse stocks recommended.
23100.....	do.....	Jan. 3, 1903.....	Nickel steel fuse stocks required.
30024.....	do.....	Mar. 11, 1903.....	Comments on report from Frankford Arsenal.
23100.....	do.....	Mar. 25, 1903.....	Firing tests. Form of plunger to be modified.
1003.....	Combination fuse. John M. Grau.	Feb. 14, 1903.....	Design unsatisfactory.
38321.....	Time fuse. H. L. Smith.....	Apr. 16, 1903.....	Do.
23850.....	Simple shell tracer.....	Aug. 23, 1902.....	Firing tests. Further trials recommended.
	Do.....	Apr. 30, 1903.....	Purchase recommended for 1-pounder shell in subcaliber tubes.
<i>High explosives.</i>			
35502.....	Ammonel. G. Roth & Co.....	Aug. 9, 1902.....	Not recommended.
23100.....	Plant for loading high explosives.	Oct. 31, 1902.....	Plans proposed.
23100.....	Preparation of high-explosive shell for service.	Mar. 22 Nov. 14, 1902.	Methods proposed.
<i>Sights and range finders.</i>			
4613.....	Swasey 3-inch depression range finder.	July 17, 29, 1902..	Tests completed. Recommended.
37081.....	Horizontal base range finder, Davis.	Oct. 31, 1902.....	Tests completed. Not recommended.
37848.....	Bar sight with 3-inch telescope, Warner & Swasey.	Mar. 5, 1903; June 18, 1903.	Desirable changes of design. Tests completed. Modification recommended.
35935.....	Zeiss range finder.....	Nov. 4, 1902.....	Purchase of instrument for field artillery recommended.
4613.....	Horizontal base range finder, Warner & Swasey.	Nov. 13, 1902; Jan. 31 May 12, 1903.	Design considered. Model to be prepared for examination.
36020.....	Automatic sight for guns, Dragoumis.	Feb. 26, 1903.....	Design unsatisfactory.
36020.....	Semiautomatic sight, Capt. E. A. Hubbard.	June 6, 10, 1903....	Recommended for trial on seacoast guns.
39063.....	Range-finder attachment for infantry rifle, A. P. Collins.	Dec. 18, 1902.....	Not recommended.
<i>Miscellaneous.</i>			
36519.....	Wolf air-shock indicator for velocimeters.	July 12, 1902.....	Tests completed. Not recommended.
32927.....	Continuously registering pressure gauge, Golaz.	July 21, 1902.....	Tests completed. Use limited.
13458.....	Means of removing old paint from gun carriages.	Nov. 21, 1902.....	Test completed. Satisfactory.
32861.....	Use of glycerin mixed with water in recoil cylinders of gun carriages.	January 14, 1903..	Tests completed. Neutral oil preferred.
35271.....	Pendulum apparatus and pressure gauges, A. and R. Hahn.	March 26, 1903....	Tests completed. Satisfactory.
32455.....	Care and cleaning of recoil cylinders of gun carriages.	May 30, 1903.....	Do.
23565.....	Packing extractor for seacoast gun carriages.	June 18, 1903.....	Tests completed. Pattern recommended.
37514.....	Ammunition truck for loading and fusing shell. Sergeant Townsley, 28th Company, C. A.	June 19, 1903.....	Not needed in service.

SPRINGFIELD ARMORY.

172. The armory has been commanded during the year by Col. Frank H. Phipps, Ordnance Department.

173. *Manufactures*.—Among the principal stores manufactured during the year were 61,838 magazine rifles, caliber .30, model of 1898; 1,505 officers' sabers and 50 officers' swords. There were repaired 16,250 magazine rifles, caliber .30, model of 1898, together with a large number of revolvers, sabers, and Springfield rifles, and 32,020 bayonet scabbards were altered to the model of 1899.

174. The following stores were inspected and received from manufacturers during the year, viz: 8,000 Colt's revolvers, caliber .38, model of 1901; 3,107 Colt's revolvers, caliber .45, double action; 1,900 Colt's revolvers, 5½-inch barrel, cleaned and repaired; 46 Colt's automatic guns, caliber .30, with spare parts and accessories, and with carriages, limbers, tripods, and mounts; 10 Gatling guns, caliber .30, model of 1901, with carriages, limbers, tripods, mounts, and spare parts; 200 Colt's automatic pistols, caliber .38, model of 1901; 200 Remington shotguns, 12 gauge, and 100 Winchester repeating shotguns, 12 gauge.

175. *United States magazine rifle, model of 1903*.—On June 20, 1903, orders were given the commanding officer, Springfield Armory, to begin immediately the manufacture of the fixtures, dies, tools, gauges, etc., required for making 225 of these rifles per day at Springfield Armory, and at the same time the necessary number of fixtures, gauges, etc., required for making 125 rifles per day at Rock Island Arsenal. In the following month these instructions were changed so as to direct the manufacture of sufficient fixtures, etc., for making 400 rifles per day at the Springfield Armory. Although the changes embodied in the different parts of this rifle involved the alteration of many of the fixtures, gauges, etc., previously made, the production of the new rifle will be commenced on or about November 2 next. The manufacture of the additional fixtures, etc., has been so advanced that an output of 225 rifles per day of eight hours is expected to be obtained at Springfield Armory before the end of the present calendar year. The fixtures, tools, gauges, etc., for Rock Island Arsenal will be completed, installed, and the plant may be put in operation before the end of the present fiscal year, although in a work of this magnitude there is always the chance of unforeseen delays toward the end.

When the present service arm was adopted in 1892 fifteen and one-half months elapsed before the first arm was made, twenty and one-half months before a daily output of 40, and over two years before a daily output of 80 rifles was obtained. The fixtures, tools, gauges, etc., required for manufacturing 125 of the new rifles per day and nearly all of the parts for 5,000 arms were completed within fifteen months from the date of the order. After this arm was adopted the alterations in the fixtures, etc., required by the changes made in the rifle, were completed, and the work on the additional fixtures ordered was prosecuted, so that an output will be obtained within four and one-half months, which will be increased to 225 per day within six months from the date of its adoption.

176. *Machines*.—Three hundred and two machines have been purchased during the year, at a cost of \$121,795.44, leaving a balance on hand of the appropriation for machinery for enlarging the plant of \$33,239.23.

177. *Grounds and buildings.*—The grounds and roads have been kept in a good state of police throughout the year.

178. *Water shops.*—The installation of machinery in the new wing of the water shops has proceeded steadily, and nearly all of the machines are now in place. With the completion of this work the water shops will be equipped to turn out 400 barrels per day of eight hours, together with the same number of the other parts of the rifle which are manufactured there.

179. *Changes in methods of manufacture.*—As the result of experiments, the operation of reaming the barrel has been materially reduced, both in time and cost. This has been obtained by the use of solid reamers instead of the chip reamers formerly used. With the old reamers the following prices were paid for the different operations of reaming: First reaming, \$0.012 per barrel; second reaming, \$0.028 per barrel; third reaming, \$0.05 per barrel. The use of the new reamers permitted the reduction of these prices as follows: First reaming, \$0.0071 per barrel; second reaming, \$0.0165 per barrel; third reaming, \$0.0106 per barrel. On a daily output of 250 barrels these reductions amount to \$13.95. At the same time the quality of the work is better and the number of barrels spoiled in these operations greatly reduced. These advantages have been secured without any reduction in the earnings of the men employed on this work. So far there has been sufficient water power to meet all wants at the water shops, and much of the time considerable water is running over the dam, even with the additional wheel which has been put in. Should it, however, fail at any season of the year, the steam engine will furnish ample power to meet all requirements.

180. *Experimental firings.*—During the year firings have been made for a variety of purposes, the most important being for the development of the new rifle. Firings were also made to test for accuracy gallery practice ammunition; to determine the best thickness for the front sight; to graduate wind-gauge sights for the Gatling and automatic machine guns; to test for accuracy a subcaliber chamber for the new rifle in comparison with the Morris aiming tube, which runs the entire length of the barrel. Besides which reports have been made on the following subjects: Additional test of Cole system of rifling, test of various clips and packets for use in United States magazine rifle, caliber .30; test of Webley-Fosbery automatic revolver, test of reduced range cartridges, test of Mannlicher automatic pistol, test of "New Service" Colt's revolver, caliber .45.

FRANKFORD ARSENAL.

181. The arsenal has been commanded during the year by Lieut. Col. Frank Heath, Ordnance Department.

182. *Artillery cartridge plant.*—The building for this plant was completed during the year and the machinery installed.

The present yearly capacity of this plant is—

- 2,000 6-inch Armstrong cases.
- 1,500 4.72-inch Armstrong cases, short.
- 1,500 4.72-inch Armstrong cases, long.
- 5,000 15-pounder R. F. cases.
- 10,000 3-inch field-gun cases.
- 10,000 2.95-inch (75 millimeters) Vickers-Maxim cases.
- 5,000 6-pounder cases.
- 10,000 1.65-inch cases.

183. This amount can be increased by the installation of additional machinery, for which there is sufficient floor space.

184. *Cartridge cases for night practice and saluting purposes.*—For these short cases have been adopted for the 6 and 15 pounder R. F. guns and the 4.72-inch and 6-inch Armstrong guns.

185. These cases are just long enough to take the saluting charge and wads. Most of the cases are obtained by cutting down cases, otherwise unserviceable, and fired cases turned in from the different posts.

186. *New carpenter shop—Box making and packing shop.*—The former was completed in May and the latter will be finished in September.

187. *New power plant.*—The building for this plant is a one-story brick and stone structure with a slate roof. It is divided into three rooms, viz, engine room, boiler room, and coal bin.

188. The present boiler installation furnishes about 1,200 horsepower, while sufficient floor space remains for duplicating the plant.

FUSE DEPARTMENT.

189. *Base percussion fuses.*—The introduction of high explosives in shell has necessitated designing a fuse to replace the present service design of shock resistance to arming, which was not entirely safe for low resistance nor from violent shocks for the high resistances. As a result of study and trial at Frankford Arsenal and test by the Ordnance Board at the proving ground, a centrifugal parallel movement plunger, arming by the rotation of the projectile, has been devised. The credit for the details of this plunger is due to Mr. Matthew McBride, foreman of the fuse department.

190. *Time fuses.*—After two years of exhaustive experiments with the service time train for fuses, having in view improvement in uniformity and regularity, the conclusion has been reached that the defects are due to the design of that fuse; fuses of the general design of those with superimposed circular time trains have therefore lately been manufactured and are undergoing test. In these the time of burning has been increased from 15 seconds to 22 seconds, to meet the greater range of the shrapnel for the new field gun.

191. *Detonating fuses.*—Experiments have also been in progress during the past two years to develop a detonating fuse for mountain, field, and siege steel shell for high explosives. Such shell for the 75-millimeter Vickers-Maxim mountain gun, 3.2-inch B. L. rifle, and 3-inch field gun, 5 and 7 inch B. L. rifles, and 7-inch B. L. howitzer have been designed by the Ordnance Board in connection with this work, and experimental lots of each caliber have either been procured or are being manufactured for the Department. In designing these shell the idea of providing a maximum quantity of explosive to be fired in a metal envelope just strong enough to resist strains of discharge and impact has been kept in view. The fuse has been placed in the point instead of the base, in order to remove danger of premature explosion due to leakage of gases around the thread joints. The original plans contemplated the use of a combination-point detonating fuze for these shell, as it is essential that the burst should take place in air in order to get the searching effect in trenches. The Ordnance Board decided, however, that there will always exist the possibility of premature explosions with time fuses, and that the burst in air could

be secured with the delayed-action percussion fuse. The experimental lots of fuses manufactured for these shell are therefore all of the point-percussion detonating type, with delay action of 0.02 second.

192. *Drill primers*.—The cannon friction primer (nonobturating), designed for use with adaptor as a drill primer for saluting purposes, for subcaliber firing, and for night and other practice, was found unsatisfactory, particularly as the conditions of firing with the regular service primer could not be simulated. To overcome the objections there have been designed for friction firing, for the drill purposes enumerated above, drill primers that are identical in exterior form and manner of firing with the service primers, and are, except for electric firing, as effective as the latter for the purposes desired.

193. *Long 110-grain percussion primer*.—In view of the objection to the use of an igniting charge separate from the igniting charge of the primer a new percussion primer has been designed. The body of this primer is drawn, insuring strength and freedom from defects. The primer contains an igniting charge of loose and compressed powder amounting to one-fourth of an ounce.

194. *Shrapnel department*.—The main work of this department has been to manufacture 16,500 shrapnel for the 75 mm. mountain gun, 12,000 having been completed and are being fused with the service 15-second fuse. While this fuse reduces the shrapnel range from 4,374 yards (the extreme range of the gun) to 4,000 yards, its reliability as compared to the 28-second fuse warrants its use.

195. Experiments have been in progress during the year to develop the best possible shrapnel for the new field gun. A satisfactory design has been obtained. Ten thousand of these shrapnel are under manufacture. The new shrapnel will have as bursting charge a smoke-producing compound, steel balls, and a 22-second time fuse.

196. *Chemical laboratory*.—The laboratory has been continuously occupied in examination and chemical test of smokeless powders, high explosives, and other materials submitted for chemical analysis. Five hundred and eighty-two samples of smokeless powder and explosives have been reported upon during the year.

197. A careful study of the prescribed tests of powders has been made, and as a result tests intended to insure more uniform powders have been drawn up and approved. Much is expected from the new heat and stability test, which is the outcome of careful study and investigation by Mr. Sy, assistant chemist. Physical tests by impact and by slow compression have been added to the previous tests, as investigation of the irregular ballistic results obtained at the proving ground led to the conclusion that the physical condition of smokeless powders has much to do with the uniformity, independently of the chemical stability.

198. *Small-arms cartridge plant*.—Under the operation of the piece-work system, the capacity of each machine in this plant has been increased. As soon as certain modifications are made in the location of the machines, the daily output of cartridges of all kinds can be increased from 192,000 to 225,000 or more. During the year Capt. Ormond M. Lissak, Ordnance Department, U. S. Army, has devoted with remarkable success much time and attention to the improvement of the machines used in their manufacture. He has designed no less than four machines which are in successful operation, cheapening and accelerating production.

199. *Changes in cartridges.*—Exhaustive tests have proved the superiority at long range of the smooth bullet over the canelured bullet formerly used. A smooth, sharp-pointed bullet, with flat base, has been adopted for the .30 caliber cartridge. Its advantages are greater accuracy at long ranges, greater penetration, and economy in manufacture.

200. *Reduced range cartridges.*—A lead bullet weighing 220 grains is used in this cartridge, and gives satisfactory results.

201. The use of this ammunition at short ranges with properly reduced targets enables target practice at long ranges with full-sized targets to be simulated, even to the extent of using the same sight elevations.

202. *Primer for Colt's double-action revolver, caliber .45.*—A new primer has been adopted for the cartridge for this arm, made necessary by the different intensities of the blow of the firing pin when the weapon is used in single or double action.

203. *Blank cartridge for .45 Gatling gun.*—A cartridge similar to the .30 caliber blank cartridges has been produced for the .45 Gatling gun. The case has the shape of the complete .45 caliber ball cartridge, the mouth being closed in rounded form, after the introduction of the charge.

204. *.38-Caliber cartridge.*—Complaints have been received concerning the .38-caliber ball cartridge used in the Colt's double-action revolver. The requirements of this weapon are difficult to meet, the trigger pull having a minimum value of 6 pounds in single action and a maximum of 12 pounds in double action. The blow of the firing pin on the primer of the cartridge varies correspondingly. The primer must be so constructed as to fire with certainty under the lightest blow and not to be pierced by the heaviest blow. Information has been received of both misfires and piercing of primers, showing that the demands upon the primer are too great and that a primer which will always fire with the lightest blow can not withstand the heaviest blow without piercing. From the complaint received in regard to the action of the cartridge in service it is believed that attention has not been given to the adjustment of the tension screw for regulating the pressure of the mainspring, and consequently the required blow is not delivered to the primer.

205. Another cause of misfire in this revolver is the frequent failure of the firing pin to deliver its blow centrally on the primer in double action. It is essential for certainty of fire that the firing pin strike centrally the primer over the point of the anvil.

206. The improvement of the cartridge is receiving the attention of the Department.

207. *Powders, etc.*—Experiments have been conducted during the year to determine the comparative keeping qualities of nitrocellulose and nitroglycerin powders designed for use in caliber .30 rifle ammunition. These tests have indicated the superiority of the nitroglycerin powders such as are used for the caliber .30 rifle ball ammunition, over nitrocellulose powders for the same purpose as represented by the samples tested.

208. *Caliber .30-rifle bullets.*—Several lots of cupro-nickel ball jacket metal have been tested and the metal found of high quality. Bullets of the latest model point made of this metal gave an average penetration

of 55 inches in pine at 50 feet from the muzzle, for a muzzle velocity of 2,000 foot-seconds, and 61 inches for a muzzle velocity of 2,300 foot-seconds. These bullets, whether fired into pine or subjected to the more severe test of being fired obliquely into water, show upon recovery no signs of stripping and are practically undeformed.

209. The latest form of bullet is not canelured, but before assembling in the case is coated with Japan wax and graphite. Extensive tests have proven that this bullet gives a cartridge as waterproof as the former bullet with three canelures.

SANDY HOOK PROVING GROUND.

210. The proving ground was commanded from the beginning of the fiscal year until November 1, 1902, by Capt. E. B. Babbitt, Ordnance Department; from that date until the end of the year by Lieut. Col. Charles S. Smith, Ordnance Department.

211. Experimental and proof firings have been conducted in the usual manner. The objects of firing have been to test service steel projectiles received from contractors; powders, guns, saluting powder, and fixed ammunition. The total expenditure of powders was 143,277 pounds; of high explosives 2,552 pounds.

212. *Test of projectiles.*—The following projectiles received from contractors have been subjected to ballistic tests: 3-inch Driggs-Seabury shrapnel; 6-inch Frankford Arsenal shrapnel; 6-pounder Driggs-Seabury A. P. shell; 6-pounder American Ordnance Company A. P. shell; 6-inch A. P. shot; 6-inch A. P. shell; 10-inch A. P. shell; 12-inch A. P. shell; 12-inch D. P. shell; 12-inch torpedo shell.

213. *Guns proved.*—The following guns have been proved:

1-pounder subcaliber tubes.....	9
6-pounder Driggs-Schroeder R. F. guns.....	10
15-pounder Driggs-Seabury R. F. guns.....	2
5-inch siege guns.....	11
5-inch R. F. guns.....	15
6-inch B. L. rifles.....	1
7-inch B. L. howitzers.....	23
8-inch B. L. rifles.....	1
12-inch B. L. mortars.....	27
Total.....	99

214. A large amount of powder for guns of all calibers has been tested, involving a great deal of careful firing and a large amount of fixed ammunition. Six thousand nine hundred and fourteen rounds were fired from the proof battery. In a number of cases each round represented two, three, or four objects undergoing test, which necessitated the rendition of separate reports for each. The 99 guns proved were also star-gauged, and records of star-gauging (before and after firing), records of firing, and inspection reports prepared.

215. *Machine shops.*—The shops have been primarily occupied with the repair of parts in connection with the experimental work of the proving ground. They have in addition done much work in repairs and alterations to the armament in the central and in the Sandy Hook armament districts. To meet the increased demands it has been necessary to increase the force of mechanics and to largely add to the number of machines, including a steam hammer and a brass furnace in the smith shop.

216. *Instruction of officers.*—Electrical apparatus purchased for the instruction of student officers has been set up in a room temporarily arranged for the purpose. It is hoped later to secure an appropriation for a suitable physical laboratory and museum where these and other apparatus may be used for the instruction of young officers, and where the various designs of ordnance construction may be arranged and utilized in the study of the development of the various features. The arrangement of the switchboard and of the machines as at present located are such as to enable the making of complete tests of all machines, both as generators and as motors; a course of such tests and of other practical electrical work has been drawn up, and a similar course will be outlined for the chemical laboratory as soon as it is completed and the necessary apparatus installed.

217. A practical course in machine work has been established, which, although limited, is illustrative and useful. A master mechanic has been transferred from the Frankford Arsenal and detailed as practical assistant to student officers in their study and practice of machine work. The problem of designing a field gun of 3.8-inch caliber, with its carriage, which should embody the principles of the recently adopted material for field artillery, was assigned as an exercise, and when completed was found of sufficient merit to use as a general design from which to make complete drawings for the production of an experimental gun and carriage.

218. All the officers have taken an active interest in the work, and have been prevented only by the great volume of their proof work and other post duties from accomplishing more in the direction of practical instruction.

219. *General improvements and construction work.*—An addition to the office and instruction building nearly doubling the available accommodations has been made, and the establishment of an intercommunicating system of telephones connecting the office, proof battery, storehouse, and shops has greatly facilitated the dispatch of business.

220. *Chemical laboratory.*—This building, begun about June 1, is to be completed about October 1.

221. The chemists and laboratory equipment at Frankford Arsenal will be transferred to this point, and in the future the chemical analysis of powders will be conducted simultaneously with their proof. A course of instruction in the chemistry and chemical tests of smokeless powders will also be inaugurated.

222. A temperature plant, for which \$6,000 was appropriated by Congress, has been completed and, in connection with the laboratory, will be utilized to conduct a number of important investigations of the action of smokeless powder under service conditions.

223. A most useful locomotive crane of 80,000 pounds capacity has been procured.

224. *Improvements in range, targets, etc.*—Plans have been completed for establishing permanent velocity screens, for grading the ranges, and for constructing suitable bomb proofs on the ranges. These are necessary for the proper observation of fire, especially shrapnel and high explosive shell fired from new field guns.

225. An estimate of \$4,000 has been submitted to cover the cost of these improvements.

226. *Freight received and shipped.*—The following statement shows

the weight of freight received and shipped during the fiscal year by the railroad, of which the length is 6 miles, from July 1, 1902, to June 30, 1903, viz:

Received.....	pounds..	15, 247, 762
Shipped.....	do.....	4, 459, 431
Total.....		19, 707, 193
Number of loaded cars received		441
Number of loaded cars shipped.....		103
Total.....		544
Average number of passengers per day		400
Total number of passengers carried during the year.....		146, 000
Equipment:		
Locomotives		2
Locomotive crane		1
Passenger coaches		4
Freight cars, flat		6
Motor car.....		1

227. The following guns and carriages have been issued during the year:

Guns:		
6-pounder R. F. guns.....		10
15-pounder R. F. guns.....		2
5-inch B. L. siege rifles		18
5-inch R. F. guns.....		15
6-inch R. F. guns.....		5
7-inch B. L. howitzers.....		14
7-inch B. L. mortars.....		19
10-inch B. L. rifles		2
12-inch B. L. rifles		4
12-inch B. L. mortars.....		36
Total.....		125
Carriages:		
6-pounder Driggs-Seabury carriage and rampart mount.....		10
6-inch disappearing.....		1
Short recoil field carriage		1
Total.....		12

UNITED STATES POWER DEPOT.

228. In January, 1902, a board of officers was appointed to lay out a definite plan for the enlargement of the facilities at the depot for the preparation and issue of ammunition and ordnance stores. This board recommended buildings and improvements costing approximately \$478,000. Of this sum Congress has appropriated \$140,000, principally for the construction of a magazine for storing high explosives and for the necessary plant for loading this explosive into armor-piercing projectiles.

229. Of the construction authorized, the magazine, charging house, and some minor structures are approaching completion. In the meantime a temporary plant for the charging of projectiles with high explosives has been erected and is in operation.

230. It is proposed to increase the present water power available by raising the dam 3 feet. This will, besides increasing the head, add about 118,000,000 gallons to the present lake.

231. *Issues.*—The number of issues of powder and projectiles for the year amounted to 441, involving a total weight handled of about 4,800,000 pounds.

MANILA ORDNANCE DEPOT.

232. The depot was commanded during the year by Maj. A. H. Russell, Ordnance Department. Its functions are the supplying of arms, ammunition, and equipments to the troops in the Division of the Philippines, manufacturing limited quantities of ordnance stores, and repairing unserviceable ordnance stores turned in by troops. In addition, the depot has been a source of supply for the Philippine constabulary, and to a large degree for the Marine Corps and Navy Department in that division.

233. *Offices, shops, and storehouses.*—The depot occupies the same site as the Spanish arsenal, known as the Maestranza de Artilleria, did prior to the evacuation. The offices and shops constitute a quadrangle, the offices occupying one side and the shops the remaining three sides. The floors of the offices are about three feet below the surface of the outside ground and are flush with the surface of the interior of the quadrangle.

234. The proximity of the offices to the shops is the source of a great deal of annoyance, requiring the doors of many of them to be kept closed during working hours. In addition they are not as healthy as they should be. The cases of sickness among the clerks at this depot have been more than usual and it is considered that this is largely due to the low site of the offices. In the estimates submitted to Congress is a provision for completing the office building partly erected by the Spaniards. This building is on a comparatively high site and if the money asked for is appropriated the building will answer admirably for the use of the clerks.

235. The shops are inadequate for their purpose. Both the armory and the harness shop require to be extended considerably.

236. It is well known that in a tropical climate leather equipments deteriorate very rapidly, and it is desirable to have a harness shop adequate to meet the demands of the troops.

237. During the wet season it is difficult to keep small arms in good condition; the bluing wears off rapidly, with the result that the arms in a short while become very unsightly. It is desirable therefore to extend the armory so that arms in the possession of troops can be reblued more frequently.

238. The tin shop which was established at the depot has proved to be a success, as the retinning of certain articles of equipment has given great satisfaction.

239. The power plant at the depot, as stated in the last and prior reports, has required frequent repairs. It is proposed to install there an adequate electric plant to run all the shops and to light the premises, for which the greater part of the machinery is on the way to Manila. Much of this plant was shipped from Frankford Arsenal, as the extension of the plant there rendered it necessary to install heavier machinery. With the installation of this plant the depot will be in a position to

manufacture and repair articles of ordnance stores in the most economical manner, and at the same time the shop will be clean and well ventilated.

240. The storehouses are not satisfactory for their purposes. They are generally one-storied, with the ground floor flush with the outside. It is proposed to add a second story to certain of these buildings, giving additional and better storage. During the past year two of the storehouses in Fort Santiago, which were filled with field-gun ammunition, were removed from the jurisdiction of the depot, and it was necessary to make provision for this ammunition within the depot proper, and the space therefor was inadequate. It is believed that in case of completion of the office building and the addition of another story to the present single-storied storehouses the depot will be in an excellent position, so far as office and storehouse room is concerned.

241. *Manufactures and repairs.*—The principal manufactures of the depot consist of horse equipments for sale to officers, and the minor parts of infantry and cavalry equipments for issue to the service.

242. Important experimental work was also undertaken at the depot, consisting of manufacturing pack frames for Vickers-Maxim mountain gun so as to be used with aparejos. As improved this pack frame will take all parts of the gun, carriage, and ammunition. Two sets of these frames have been manufactured and issued to the mountain batteries for trial. A pack outfit was also manufactured for carrying the 3.6-inch mortar and gave considerable satisfaction. To make the platform for the mortar pack more easily it was cut and hinged through its shorter axis.

243. The work in the shops is generally done by native workmen, one foreman and one assistant in each being Americans. There are employed at the depot, not in a clerical capacity, 12 Americans and 188 natives.

244. *Issues and receipts.*—In the matter of issues and receipts the depot compares very favorably with the larger arsenals in the United States. The total number of requisitions received at the depot from troops was 1,268, from the Navy Department and Marine Corps 14, and from the Philippine constabulary 2, making a total of 1,284. The total number of issues for the year was 1,528. The greatest number for one month was in June, 1903, amounting to 148, and the greatest number for one day was 25, on June 8, 1903.

245. The same policy as in the previous year was continued in filling requisitions. Where troops were stationed at considerable distance from the depot and transportation was infrequent, the supplies furnished were greater in quantity; nearer Manila the issues made were smaller and troops were expected to make more frequent requisitions for their supplies.

246. Accurate reports are kept at the depot, giving the model of all the arms in the hands of troops, so that it is rare that a requisition has to be returned for correction. The depot has always made it a point to keep the troops informed as to the latest improvements in arms and equipments.

247. In view of the severe climatic conditions it has been held desirable to keep all surplus property at the depot, and not in the hands of troops.

248. The principal issues made from the depot to the troops were as follows:

- 3,100 magazine rifles, caliber .30.
- 310 Springfield rifles, caliber .45.
- 400 magazine carbines, caliber .30.
- 3,800 Springfield carbines, caliber .45.
- 5,900,000 ball cartridges, caliber .30.
- 871,000 ball cartridges, caliber .45.
- 800,000 ball cartridges for caliber .38 revolver.
- 13,000 pounds of harness leather and varying quantities of other supplies.

249. The number of receipts of ordnance stores at the depot was 1,318. Of those received from the troops in the division a few of the principal items are as follows:

- 23 Gatling guns.
- 9 mountain guns.
- 9,500 magazine rifles and carbines, caliber .30.
- 2,600 Springfield rifles and carbines, caliber .45.
- 2,700 Colt's revolvers, caliber .38 and caliber .45.
- 5,250,000 ball cartridges, caliber .30, and varying quantities of other stores.

The mountain and machine guns and the small arms were practically all turned in for overhauling. Of the stores turned in by troops a very large quantity was totally unserviceable; these were placed before an inspector and condemned. The total number of items placed before the inspector was over 400,000, and the money value of the property condemned was nearly \$98,000.

250. There were shipped to the Manila depot from the United States a considerable amount of ordnance stores, the principal of which were:

- 20 Hotchkiss guns, with their carriages and complete equipments.
- 18 Colt machine guns.
- 1,300 Springfield carbines.
- 1,000,000 ball cartridges for caliber .38 revolver.
- 500,000 ball cartridges, caliber .45.
- 500,000 blank cartridges, caliber .30, and varying quantities of other stores.

251. As stated in previous reports, the most difficult problem to solve in connection with keeping troops supplied with stores is that of ammunition. The ammunition shipped from the United States in the early days of American occupation was not waterproof, and the boxes were not zinc lined, as at present. The excessive moisture in the Philippines appears to affect the primers, rendering them uncertain on firing. Moisture has also affected the primers furnished with artillery ammunition. The later boxes of ammunition shipped to the Philippines all have zinc linings, and it appears that even they, when unduly exposed to moisture, have their linings corroded, so that in a short time moisture can reach the ammunition. The only sure remedy, after taking every precaution to ship the ammunition in cases with thick zinc linings, is to have suitable storehouses in which to keep it, avoiding as far as practicable opening any box until the ammunition is actually needed.

252. *Fiscal affairs.*—During the fiscal year the amount of money received under Ordnance Department appropriations was \$76,550.80, and the total amount of the disbursements was \$75,853.09. These disbursements cover principally the salaries of the employees at the depot, as the quantity of material procured in Manila is not considerable. During the year the sum of \$1,150 was expended out of the

appropriation for "Barracks and quarters, 1903," pertaining to the Quartermaster's Department.

253. The sales of serviceable ordnance stores to officers for their use during the year amounted to \$9,700.48, and to the insular government of the Philippines and other bureaus to \$15,074.74. It may be added that the depot has been a source of great convenience to officers in this respect from the time of its establishment to the present day.

254. The sales to the Navy Department and the Marine Corps, settlement for which was made through the Treasury Department, consist of the following principal items:

To the Navy:

500 magazine rifles.
750,000 ball cartridges, caliber .30, together with large supplies of spare parts for the present magazine rifle.

255. To the Marine Corps the sales have been principally of target-practice material.

256. From the establishment of the Philippine constabulary considerable quantities of ordnance stores have been transferred to the insular government of the Philippines for the purpose of arming and equipping that organization—practically all its arms, ammunition, and infantry equipments have been supplied by the depot. For the stores so transferred the United States has so far been reimbursed to the extent of \$8,429.36, leaving a balance of \$119,229.33 unpaid. In view of the fact that the act of March 2, 1903, authorizes the different bureaus of the War Department to use only throughout the present fiscal year moneys received on account of stores transferred to the insular government of the Philippines, this Department has been endeavoring to obtain settlement with the Philippine government, but thus far without success.

257. The cost of the stores transferred to the insular government of the Philippines is considerably more than the sum charged against it. This is due to the fact that a portion of these stores were partly worn, and the arms were of a type now obsolete so far as the uses of the Army are concerned. The principal items of the indebtedness of the insular government may be enumerated as follows:

For revolvers, shotguns, spare parts, and equipments, new condition when issued	\$19,064.55
Colt's revolvers, caliber .45, transferred after service in the Philippines, at a reduction of 10 per cent on cost	6,858.00
Colt's revolvers, caliber .45, turned over directly to the Philippine constabulary by officers of the Army, and without any repairs to them, at a discount of 20 per cent from cost price	39,972.00
Remington shotguns, turned over by officers having them in use, at a discount of 40 per cent from cost price	6,467.85
Equipments formerly in the hands of troops or native police, at a discount of 50 per cent from cost price	2,637.68
4,000 Springfield carbines, caliber .45, model 1884, with appendages, at \$8 each, the price fixed by the Chief of Ordnance, the regular price being \$12.73 each	32,000.00
410,000 carbine ball cartridges, cost price	6,970.00

258. This Department is very anxious to have the indebtedness of the insular government settled as early as practicable, not only for the reason that the limit set by law within which it can be used is short, but also because of the fact that money can be used to advantage during the present fiscal year for procuring arms and equipments for the use of the Army.

SAN JUAN ORDNANCE DEPOT.

259. The depot was commanded during the year by Lieut. J. E. Wyke, Artillery Corps. The work of the year has consisted for the most part in supplying the troops in Porto Rico with ordnance stores, for the purpose of which the depot is maintained, and in cleaning and making minor repairs to such stores. No manufacturing is done at this depot, and there is no machinery installed there.

260. It has been proved that the general classes of ordnance stores, when properly packed and cared for, can be stored in Porto Rico for from two to four years without deterioration, at the end of which time they are found to be in as good condition as when received from the United States; leather goods should not be kept on hand for more than two years. However, in view of the small number of troops in the island at the present time it is not thought advisable to keep on hand at the depot more than a year's supply, as the stock can be replenished within a few weeks from the United States.

261. In view of the position of Porto Rico with reference to the United States and the West Indies, it is considered by this Department advisable that a depot or arsenal be established at or near San Juan for the storage and repair of material for the infantry, cavalry, and artillery, and for repair of the seacoast armament. This will require two tracts of land, one convenient, if practicable, to water and rail transportation, upon which can be erected the necessary storehouses, shops, and quarters for officers and enlisted men. The second tract must be properly situated for one or two magazines for powder, fixed ammunition, and other high explosives. In compliance with instructions of the honorable the Secretary of War of January 15, 1903, this Department in letter of March 6, 1903, designated two sites on the survey made by Capt. W. V. Judson, U. S. Engineers, under the orders of the War Department; the first, lying to the southeast of the citadel of San Cristobal, for storehouses and shops, and the second, near San Geronimo, for magazines. Neither of these sites has, however, been reserved for its use, and the Department is still without territory for meeting the requirements of prudent preparation.

262. In addition to the work of operation of all the manufacturing arsenals of the Department, there has been in process at the Springfield Armory, the Rock Island Arsenal, and the Frankford Arsenal, commanded respectively by Colonel Phipps and Lieutenant-Colonels Blunt and Heath, very considerable enlargement of the plants, both for the purpose of increasing their capacity and for that of undertaking the manufacture of material not before produced. Although there has not yet been time for the confirmation in successful output of the satisfactory character of the new constructions and their equipment, it is believed that the careful attention and good judgment of those who have been charged with the work have provided the Department with increased facilities of great value.

BETHLEHEM STEEL WORKS.

263. During the fiscal year the following work has been in progress at the Bethlehem Steel Works, under the supervision of the Inspector of Ordnance at those works.

264. *Twenty-five 5-inch R. F. guns, steel, model of 1897.*—The one gun reported not completed at date of last report has been finished and shipped.

265. *One 5-inch combined rapid-fire and disappearing gun and carriage.*—But little work has been done on this gun and carriage this year, which may be considered 85 per cent completed. The construction is by allotment by the Board of Ordnance and Fortification.

266. *One 6-inch R. F. gun on pedestal mount.*—Considerable work has been done on the gun and some on the carriage, so that the gun is now 90 per cent and the carriage 65 per cent completed. The construction is from an allotment made by the Board of Ordnance and Fortification.

267. *10 and 12 inch B. L. rifles.*—During the year two 10-inch and two 12-inch rifles were completed and proved, making a total of seven 10-inch and five 12-inch rifles delivered under this contract, which calls for ten 10-inch and fifteen 12-inch B. L. rifles.

268. *Five shields for 6-inch R. F. gun.*—One shield has been completed and delivered.

269. *Ten sets of forgings for 5-inch R. F. gun.*—All these forgings were delivered by the date of expiration of the contract.

270. *Four sets of forgings for 10-inch B. L. rifle,* all of which were delivered before the date of expiration of the contract.

271. *Sixty 15-pounder (3-inch) R. F. guns and barbette carriages.*—One gun was practically completed at the end of the fiscal year, 17 others were well under way, and forgings for 5 others accepted. About the same progress has been made on the mounts, and it is expected that all will be finished within the contract time.

272. *Fifty sets of nickel steel forgings for 3-inch B. L. field rifle, model of 1902.*—Eighteen of these have been delivered.

273. Besides the above, two 4½-inch experimental steel shields are under manufacture for this Department and are well under way.

MIDVALE STEEL WORKS. .

274. This company has been doing work on 13 contracts during the year, several of which were in force at the date of the last annual report. Of these, all have been completed but 3. The most important work in progress during the year was as follows:

275. Four sets of 10-inch B. L. rifle forgings, model of 1900, all of which were delivered about two months before the expiration of contract time.

276. Eleven sets of 5-inch R. F. gun forgings, model of 1900, all delivered nearly three months before the expiration of the contract.

277. The steel used in the above forgings has been uniformly of excellent quality, as shown by the numerous tests to which it has been subjected.

278. Another important contract undertaken this year was for 490 10-inch A. P. shot; 385 12-inch A. P. shell, and 350 12-inch D. P. shell. All of these were delivered within contract time except 150 D. P. shell.

WORKS OF THE DRIGGS-SEABURY GUN AND AMMUNITION COMPANY,
DERBY, CONN.

279. Shipments of guns, carriages, and ammunition have been made from these works during the year, as follows:

- 4 6-pounder guns and mounts.
- 23 15-pounder guns and mounts.
- 6,000 rounds 15-pounder common shell.
- 1,000 rounds 15-pounder steel shell.
- 1,000 rounds 6-pounder steel shell.

AMERICAN AND BRITISH MANUFACTURING COMPANY, BRIDGEPORT, CONN.

280. Under a contract for 215 1-pounder subcaliber tubes and fixtures, 112 have been shipped and the remainder are nearly ready for shipment; 95,000 1-pounder empty steel shell have also been shipped during the year, completing all orders for these shell.

281. This company is also under contract to furnish 34 3-inch field guns, and 104 subcaliber tubes for the 12-inch B. L. mortar, and the work is under way.

282. The following papers are submitted as appendices to this report:

Appendix I.—Report of Board for testing musket of new model.

Appendix II.—Rotation of racer of 12-inch mortar carriage, model of 1896.

Appendix III.—Test of Wolff air-shock indicators.

Appendix IV.—Test of maximum capacity 1-pounder shell.

Appendix V.—Report of test of Bofors 6-inch R. F. gun.

Appendix VI.—Test of 3-inch Ehrhardt sliding block breech mechanism.

Appendix VII.—Test of firing mechanisms for seacoast guns and mortars.

Appendix VIII.—Test of powder for 16-inch B. L. rifle.

Appendix IX.—Test of Hahn pendulum, micrometer, and pressure gauge.

Appendix X.—Sample shell tracer, for night firing.

Appendix XI.—Test of 37 mm. Vickers-Maxim automatic gun (pom pom).

Appendix XII.—Test of shield for 6-inch barbette carriages.

Very respectfully,

WILLIAM CROZIER,
Brigadier-General, Chief of Ordnance.

The honorable SECRETARY OF WAR.

REPORT OF THE CHIEF SIGNAL OFFICER.

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REPORT OF THE CHIEF SIGNAL OFFICER.

WAR DEPARTMENT, SIGNAL OFFICE,
Washington, October 3, 1903.

SIR: I have the honor to submit herewith my annual report covering operations of the Signal Corps of the Army for the fiscal year ending June 30, 1903.

For convenience of reference field operations of the Signal Corps are treated in this report geographically under the various headings of Alaska, the Philippines, and the United States.

ALASKAN TELEGRAPH SYSTEM.

Owing to the serious illness of the signal officer, Department of the Columbia, which necessitated his relief during the year, and the scarcity of officers, the supervision of the construction of the Alaskan telegraph system was necessarily assumed by the Chief Signal Officer of the Army in person.

During the year the system of military telegraph lines and cables in Alaska, provided for by the act of Congress of May 26, 1900, has been completed. The entire system consists of 1,740 miles, as set forth in the inclosed table.

	Inter- mediate.	Total.		Inter- mediate.	Total.
YUKON SECTION.			FORT EGBERT SECTION—cont'd.		
Nome	0	0	Valdez	3	8
Fort Davis	4	4	Keystone	12	20
Safety Harbor	20	24	Saina	19	39
St. Michael (cable)	133	157	Teikhell	24	63
Golsovia	35	192	Tonsina	24	87
Unalaklik	30	222	Copper Center	25	112
Old Woman	50	272	Kulkana	26	138
Kaltag	45	317	Talsona	20	158
Nulato	40	357	Chistochina	20	178
Koyukuk	30	387	Cheslotta	26	204
Grimkop	20	407	Mentasta Pass	20	224
Louden	30	437	Big Tokio	20	244
Melozi	35	472	Tanana Crossing	31	275
Kokrines	38	510	Denison Creek	25	300
Birches	40	550	Ketchumstock	30	330
Fort Gibbon	55	605	Gold Creek	11	341
Cosna	45	650	North Fork	19	360
Baker	25	675	Champion Creek	39	399
Tolavana	37	712	Fort Egbert	29	428
Nenana	56	767			
Chena	48	815	RAMPART SECTION.		
Fairbanks	10	825	Fort Gibbon	0	0
Salcha	37	862	Rapids	35	35
Goodpasture	60	922	Rampart	40	75
Central	32	954	Glen	35	110
Summit	58	1,012	Baker	15	125
Ketchumstock	54	1,066			
FORT EGBERT SECTION.			CABLE DISTANCES.		
Fort Lisnum	0	0	Skagway	0	0
Low River	5	5	Haines Mission	20	20
			Juneau	101	121

The connection between the Yukon section and the Fort Egbert section was made on June 20 near Salcha, in the valley of the Tanana.

The work of construction has been under the general charge of Capt. George C. Burnell, Signal Corps, assisted by First Lieut. George S. Gibbs, of the Signal Corps, working in the valley of the Tanana, and First Lieut. William Mitchell, of the Signal Corps, working from Ketchumstock through the valley of the Goodpasture.

Special credit is due Captain Burnell for the ability, energy, and resourcefulness with which, through three long years, he has labored in Alaska from the initiation of the enterprise to its completion. His labors have been splendidly seconded by the assiduous and successful efforts of Captains Mitchell and Gibbs.

Very early springs, late autumns, enormous snowfalls, summer floods, impassable canyons, and, last of all, a gold fever which stripped one officer of every civilian employee save one, have alternately impeded progress, but with energy and resourcefulness these officers have met and surmounted difficulties which seemed insurmountable. Lieutenant Gibbs pushed a line up the Tanana along a route pronounced impracticable, while Lieutenant Mitchell carried his surveys and line along the Goodpasture, across a country that had never before been trodden by the foot of a white man. Captain Burnell's work from the sea to Mentasta Pass, most difficult, commands the admiration of everyone familiar with this almost impassable trail.

It is impossible to adequately set forth the tremendous difficulties under which Alaskan military telegraph lines have been constructed and maintained. In general, it is to be premised that not 20 miles of constructed wagon road exists in the country traversed. As a rule, all material has been sledded into the interior in midwinter or carried by pack animals over the roughest imaginable trails. Conditions were so difficult that some coils of wire were carried 145 miles by pack. The magnitude of the work may be inferred by the statement that from Fort Egbert alone, between November 20, 1902, and June 30, 1903, no less than 220 tons of supplies and material were sledded or packed into the interior, it being impossible to move a ton by wagon.

The construction parties, consisting almost entirely of enlisted men of the Signal Corps and of the line of the Army; worked steadily the entire winter, although the conditions under which field work was done were of the most hazardous and appalling character. As an illustration may be mentioned the fact that from November 1 to the end of the winter, by official reports, 60 feet and 11 inches of snow fell at Fort Liscum, adjoining the Copper River Valley.

In the interior, while the snowfall was very much less, being only 4 feet 4 inches at Egbert, yet continued and terrible cold made camp life and construction work almost insupportable. The mean temperature at Fort Egbert from November to February, inclusive, a period of four months, was 2° below zero. There were prolonged periods of extreme low temperature when the mercury remained frozen, the minimum of 61° below zero occurring in January. While the past winter is believed to have been the most severe in Alaska for many years, yet such was the resourcefulness and endurance of the American soldier that the work of construction in the valley of the Tanana was carried on the entire winter without loss of life and with only one serious case of freezing.

The cold and snow of the winter were, strangely enough, more favor-

able to completing the system than were the morasses and fires of summer. The final completion of the telegraph system was made just as an extensive forest fire devastated the upper valley of the Tanana, burning thousands of square miles of valuable timber and destroying more than 100 miles of telegraph line. The damage was the more serious in that the 100 miles of line destroyed were burnt out not as a whole section, but at various points along the distance of 250 miles over which the fire extended.

Nor has repair work been less trying and dangerous along lines in operation in the Yukon and Tanana valleys. One Signal Corps man was drowned; of the line of the Army one was drowned, one frozen to death, and one crippled for life. In addition, the monotonous life at the desolate interior stations caused two suicides of Signal Corps operators.

It is doubted whether in the peaceful annals of the Army there have been met with nobler fortitude by the enlisted men equal conditions of hardship and privation. It is to be understood that the line of the Army has displayed in this work the same energy and endurance as the Signal Corps. Uncomplainingly and unremittingly the enlisted men of the line have met the adverse conditions of Alaskan life, encouraged thereto by such officers as Capt. E. T. Wilson, Corps of Artillery; Capt. Frederick Perkins, Eighth Infantry, and First Lieut. J. B. Allison, Seventh Infantry. To the effective cooperation of these and other officers is due in a large degree the early and successful completion of the Alaskan system.

The admirable qualities of the American soldier is illustrated by the fact that in this Alaskan work the enlisted men, receiving pay ranging from \$15.60 to \$54 per month, has equaled in his output and resourcefulness the work done by civilian laborers at his side receiving for the same work \$90 and their board. Discouraging as was this condition, it was faced creditably and manfully.

The cooperation of the line of the Army was originally insured through the good offices of Gen. George M. Randall, commanding the Department of the Columbia, on whose recommendation the lines were built. His successor, Gen. Frederick Funston, has continued the same policy and invariably extended his courteous and indispensable assistance in all matters relating to signal corps work in Alaska.

While communication is now had regularly by telegraph between the civilized world and the Yukon Valley westward to St. Michael, yet restoration of communication with Nome has so far proved impracticable. The cable between Nome and St. Michael was so badly injured by ice, some 40 miles having been carried away, that its repair was impossible, within the limits of the available appropriations, to meet the urgent recommendations of the commanding general, Department of the Columbia. Efforts are being made, with prospects of success in 1904, to establish communication by wireless telegraphy between St. Michael and Nome across Norton Sound, a distance of 108 miles.

The maintenance of the Alaskan telegraph lines is a task that will necessarily entail a heavy burden both on the Signal Corps of the Army and on the garrisons in Alaska. The original plan properly looked to three men at each station, two from the line and one from the Signal Corps. As the telegraph system has been extended, the number of enlisted signal men has been increased until 21 per cent of the Corps

is now engaged in Alaskan service. Meanwhile the strength of the Alaskan companies of the line has been reduced until it is almost impossible to spare more than one man for each station. Such conditions are dangerous in the extreme in a country where one man can rarely travel in safety in winter. The hazardous and difficult conditions make it of the utmost importance that the four companies of the line, those stationed at Fort Liscum, Fort Egbert, Fort Gibbon, and Fort St. Michael, be increased to 100 men at the earliest practicable date.

The commanding officers at Forts Liscum, Egbert, and Gibbon, in the order named, have the most difficult work in supplying rations and men for their respective sections. The presence of signal officers at Egbert and Gibbon improve the conditions materially at those points, but from Liscum north to Mentasta the important work has devolved on the commanding officers at the post, whose efforts have been successful.

It is not, perhaps, appreciated that every telegraph station is necessarily furnished with food and other supplies covering at least one year in advance, as otherwise the men would be liable to perish of starvation. The necessary material and supplies, including dog food, has to be furnished by sleds in midwinter or by pack animals in summer, save for stations situated on the Lower Tanana and Lower Yukon, which can be supplied by boat in summer. In short, the difficulties of the situation can only be appreciated by those having had extended personal experiences in the interior of Alaska, where the conditions are enormously more difficult than along the usual lines of travel.

SOUTHEASTERN ALASKA.

In accordance with the recommendations of the Secretary of War in his last annual report, Congress authorized the connection of Seattle by cable with southeastern Alaska, where the military posts of Skagway and Haines Mission are now reached telegraphically over Canadian lines.

The appropriation of \$485,000 was not made until March 3. At first sight it seemed practically impossible to install this cable or any part of it prior to the winter storms of 1903, which seemed to defer communication until the late spring of 1904.

The conditions were as follows: The one cable ship under military control, the U. S. transport *Burnside*, was undergoing repairs in China, while the condition of the Philippine cables demanded her presence for a time in the Philippine Archipelago. The route between Sitka and Seattle was unsurveyed. Neither cable instruments, nor even tackle in time could be obtained in America, so that the important and complicated machinery for handling the cable and the delicate instruments for operating the cable had to be planned in detail and made to order in Great Britain.

As to the cable itself, the limited appropriation properly restricted it to domestic manufacture, but being the longest cable ever undertaken in America (1,300 miles), and for a greater depth than that in which any domestic cable had ever been laid, its manufacture, inspection, and transportation involved difficulties more intricate than had surrounded any previous cable work of the Signal Corps. While the cable was to be manufactured in the vicinity of New York City, yet it was necessary to transport it some 16,000 miles around Cape Horn,

under such conditions as to storage and care as to insure its delivery, in perfect condition, to the cable ship *Burnside*, which was to receive it in Seattle Harbor.

There were no electrical engineers of cable experience in the United States who were not already engaged under conditions which made it impossible for their employment by the Signal Corps, hence electrical engineers had to be selected and trained by officers of the Signal Corps, experts in cable work. Finally, it was necessary to select and train in the complicated profession of cable telegraphy selected men of the Signal Corps. This work alone was one which it was asserted would require a year's training and practice to insure successful operation.

The installation was undertaken, however, with the determination to meet, if possible, the urgent desire of the Secretary of War, that at least one section of this cable should be in operation by the time Congress met in December, 1903.

The Chief Signal Officer selected for this important work two signal officers whose cable experiences in the Philippines, in addition to their general knowledge of electrical engineering, peculiarly fitted them for the work in hand. These officers were Lieut. Col. James Allen, to whom was intrusted the entire charge of the administrative and technical work and previsionary measures that should make the work a success, and Capt. Edgar Russel, who drew the specifications for the manufacture of the cable, a work requiring unusual professional knowledge and sound judgment, particularly as the limited appropriation made the work of obtaining a first-class cable thereby one of unusual difficulty. Captain Russel also organized the inspecting force, instructing electrical engineers of the Signal Corps, at whose head, fortunately, was Mr. Townsend Wolcott, an electrical engineer of marked ability and great practicality. In short, nearly all the theoretical work was intrusted by Colonel Allen to Captain Russel. Through the courtesy of Mr. George G. Ward, of the Commercial Cable Company, the services of Mr. A. B. Macmillan were obtained for the instruction of the enlisted men of the Signal Corps, selected carefully for training as cable operators. Dr. Alexander Muirhead, one of the recognized cable experts of the world, although unable to give his assistance in installing the cable instruments, permitted his principal expert, Mr. R. H. Edgar, to assist in this installation for several months.

It is thus evident that the question of bringing together from China, from England, and from New York and elsewhere, men, instruments, and cable, at definite points in Alaska on a definite day, involved endless complications. Such energy and ability were displayed, not only by the officers of the Signal Corps but also by the Quartermaster-General and the subordinate officers of his department, that the programme outlined in May has been substantially carried out without a break, saving an unavoidable delay of three weeks of the commercial steamer transporting the first installment of the cable, 563 miles.

The route from Seattle to Sitka was surveyed, through the courtesy of Superintendent Otto H. Tittmann, of the Coast and Geodetic Survey, by Capt. J. F. Pratt, of the Coast Survey steamer *Patterson*. Superintendent Tittmann also furnished the valuable services of Mr. Ferdinand Westdahl for astronomical and position work.

The *Burnside*, repaired at Shanghai, completed cable work in the Philippines as far as the limited stay would permit, and reaching Sitka on July 7 laid a cable of 17 miles, which had been transported over-

land by rail to Seattle, between Skagway and Haines Mission, thus bringing in direct telegraphic communication the only two military posts in southeastern Alaska.

Later, pending the arrival of the commercial steamer, cable offices were installed at Juneau, Sitka, and Seattle, at which latter place the newly trained cable operators of the Signal Corps were put under thorough drill and practice.

The cable, in charge of an electrical engineer of the Signal Corps during its long journey from New York to Seattle, was received in first-class condition and transferred, without incurring demurrage, to the cable ship *Burnside*. The cable ship was under charge of Capt. Chas. DeF. Chandler, of the Signal Corps, whose cable experience in the Philippines made him particularly valuable for this work. His services were supplemented by those of Capt. George C. Burnell, Signal Corps, and most efficient cable engineers, Henry T. Winters and David Lynch. There had also been employed and brought from Manila, with much trouble, the skilled Filipino cable men who had been trained in cable work by the Signal Corps in the Philippine Archipelago.

The *Burnside* sailed from Seattle on September 14, with Lieut. Col. James Allen in charge, and Capt. Edgar Russel, arriving in Juneau on September 22. The delay to the commercial steamer for three weeks in San Francisco was most unfortunate, as it involved cable operations in the intricate inland passage in high latitudes in rapidly shortening days. Some 40 miles below the point where the *Islander* was wrecked by striking an iceberg with large loss of life, the *Burnside* struck, during the night, a low submerged berg, which broke and cracked several plates on her bow. The conduct of the entire personnel was reported by Lieutenant-Colonel Allen to have been admirable, both at the time of the accident and later. With his usual sound judgment, Colonel Allen decided to there begin laying cable toward Juneau, and, buoying the end, the *Burnside* laid 40 miles of cable to Juneau without any repairs. Through the resourcefulness of the Engineer Department, and particularly of Chief Engineer A. J. Rick, repairs were made at Juneau, and later of a more permanent character at Sitka.

As soon as the weather permitted the *Burnside* resumed cable operations from Juneau, and laying the cable successfully opened a cable office at Sitka on October 2, thus bringing the nearest port of the American continent on the Asiatic coast into telegraphic communication with the rest of the world. The *Burnside*, now at Sitka, is confronted by the stormy season, but utilizing occasions of fair weather will lay the remainder of the cable now on board and buoy its end off Queen Charlotte Islands, and then return to Seattle for the rest of the cable.

The remaining 780 miles of finished cable left New York by commercial steamer on August 22, and if the same good fortune follows the cable operations in November as have marked this Alaskan work to the present time, the cable will be landed in Seattle by October 25 and the cable laid some time during the month of December, unless there are unforeseen delays on the part of the commercial steamer.

Despite the incompleteness of the Alaskan system until the end of the fiscal year, the lines have transmitted a large amount of business. Although the local tariffs are very low, there has been received for the

transmission of commercial messages, tariffs aggregating \$6,065.13, which has been deposited, as required by law, in the Treasury of the United States. In addition, messages for the officials of the Government have been transmitted free to a total amount of tariff value of \$20,912.56. There has been collected and turned over to the commercial lines by officers of the Signal Corps the sum of \$8,178.41. The commercial lines have also profited to the extent of \$12,200.78 for official messages paid for by the Quartermaster's Department or prepaid at the point of origin.

ALASKAN CABLE EXTENSIONS.

The connection by submarine cable of the detached system in southeastern Alaska of 1,400 miles with that of the Yukon district, 1,619 miles, is strongly recommended as in the public interests, not only as of strategic value, but as also in connection with the development of Alaska.

While the cable system of southeastern Alaska will bring the military posts of Skagway and Haines Mission in direct telegraphic communication, over purely American lines, with the department commander, yet it is now impossible to reach any garrison west of the one hundred and forty-first meridian except by means of the Canadian government lines, extending from the international boundary near Skagway to the one hundred and forty-first west meridian near Fort Egbert. The inclosed map shows the situation, the shaded portion indicating the region of the Canadian lines on which the Government of the United States is necessarily dependent in its telegraphic communication with the Prince William Sound, the Tanana Valley, the great valley of the Yukon, and the Nome region. For the completion of the Alaskan cable system and the continuance of the work provided for during the present fiscal year there has been incorporated in the estimates an item of \$321,580 for the purpose of constructing, installing, and operating the cable from Sitka to Fort Liscum. This when completed will bring all of Alaska into direct telegraphic communication over American lines with the United States.

REORGANIZATION OF THE SIGNAL CORPS.

The Signal Corps, by law, is composed of one brigadier-general, one colonel, two lieutenant-colonels, six majors, eighteen captains, and eighteen first lieutenants. There were, on June 30, 1903, twelve vacancies in the grade of first lieutenant, since which date ten officers from the line of the Army have been detailed to the Corps. The following is a roster of the Signal Corps:

No.	Name and rank.	Stations and duties. (Foreign service since appointment as regular officer.)	At present station since—
	<i>Chief Signal Officer, brigadier-general.</i>		
1	ADOLPHUS W. GREELY <i>Colonel.</i>	Washington, D. C.; foreign service (inspection duty), one year.	
1	H. H. C. Dunwoody	Commanding officer, signal corps post, Fort Myer, Va.; duty in Cuba, Dec. 22, 1898, to May 24, 1901.	Oct. 1, 1903

No.	Name and rank.	Stations and duties. (Foreign service since appointment as regular officer.)	At present station since—
<i>Lieutenant-colonels.</i>			
1	James Allen	S. S. Burnside, Alaskan cable operations; duty in Cuba and Cuban waters, May 29 to July 21, 1898; in Porto Rico, July 26 to Sept. 1, 1898; in the Philippines, Dec. 19, 1899, to Mar. 12, 1902.	Aug. 11, 1903
2	Richard E. Thompson	Signal officer, Department of the Columbia, Vancouver Barracks, Wash.; duty in Philippines, July 25, 1898, to Dec. 29, 1899.	Aug. 10, 1903
<i>Majors.</i>			
1	George P. Scriven	Office Chief Signal Officer, Washington, D. C.; in charge Signal Corps exhibit at the Louisiana Purchase Exposition, St. Louis, Mo.; duty in the Philippines, Aug. 21 to Sept. 2, 1898; Nov. 23, 1899, to July 17, 1900, and Dec. 9, 1900, to May 22, 1901; in Cuba, Feb. 6 to Aug. 5, 1899; in China, Aug. 2 to Nov. 25, 1900.	June 27, 1901
2	William A. Glassford	Chief signal officer, Division of the Philippines, Manila, P. I.; duty in Porto Rico, July 31, 1898, to Jan. 22, 1901; in Alaska, Aug. 18 to Dec. 7, 1901; in the Philippines since Feb. 17, 1902.	Feb. 17, 1902
3	Joseph E. Maxfield	Signal Corps post, Fort Myer, Va.; duty in Cuba, June 22 to July 20, 1898, and Dec. 16, 1898, to Jan. 14, 1899; in the Philippines, June 26, 1899, to July 1, 1900; in Alaska, May 27 to Aug. 18, 1902.	Aug. 1, 1903
4	Frank Greene	Signal officer, Department of Luzon, Manila, P. I.; duty in Cuba, June 22 to Sept. 12, 1898; in Alaska, Aug. 2, 1900, to July 14, 1902; in the Philippines since Sept. 26, 1902.	Oct. 2, 1902
5	Samuel Reber	Washington, D. C., on duty with War Department general staff; duty in Porto Rico, July 25 to Sept. 13, 1898; in Cuba, Jan. 6 to Oct. 1, 1899.	Aug. 15, —
6	George O. Squier	Signal officer, Department of California, San Francisco, Cal.; duty in the Philippines, Dec. 6, 1900, to June 14, 1903.	July 10, 1903
<i>Chief of the telegraph and cipher bureau of the Executive Office, with the rank of major.</i>			
	Benjamin F. Montgomery ..	On duty at the White House, Washington, D. C.	Apr. 24, 1901
<i>Captains.</i>			
1	Edgar Russel	Juneau, Alaska, engaged in installing the Alaskan cables; duty in the Philippines, Aug. 24, 1898, to Apr. 22, 1901.	July 11, 1903
2	Edward B. Ives	On sick leave of absence since July 2, 1903; duty in the Philippines, June 13, to Aug. 9, 1901.	
3	Eugene O. Fechet	Signal officer, Department of the Visayas, Iloilo, P. I.; in the Philippines since Oct. 17, 1901.	Oct. 1, 1902
4	Charles McK. Saltzman	Signal officer, Department of Mindanao, Zamboanga, P. I.; duty in Cuba, June 24 to July 6, 1898; in the Philippines since Mar. 21, 1902.	Feb. 20, 1903
5	Benjamin F. Montgomery ..	(Serving as chief of the telegraph and cipher bureau of the Executive Office, with the rank of major.)	Apr. 24, 1901
6	Daniel J. Carr	Disbursing officer, Signal Corps, Washington, D. C.	Mar. 15, 1902
7	Carl F. Hartmann	Manila, P. I.; in the Philippines since May 26, 1901; on leave from the Philippines from Oct. 8, 1902, to Jan. 31, 1903.	May 26, 1901
8	George C. Burnell	Juneau, Alaska, in connection with the installation of Alaskan cables; in Alaska since June 24, 1901.	July 15, 1903
9	Leonard D. Wildman	Washington, D. C.; on temporary duty at New London, Conn., in connection with wireless telegraph installation, since June 5, 1903; duty in the Philippines, May 9, 1901, to Oct. 1, 1902.	Dec. 1, 1902
10	Charles B. Hepburn	Signal Corps post, Fort Myer, Va.; on detached service in connection with Army maneuvers at West Point, Ky., and Fort Riley, Kans.	Dec. 16, 1902
11	Otto A. Nesmith	Eagle City, Alaska; duty in Cuba, May 17, 1901, to May 20, 1902.	July 10, 1903
12	Walter L. Clarke	Seattle, Wash.; duty in the Philippines, May 9, 1901, to Apr. 22, 1902; in Alaska, Sept. 27, to Oct. 9, 1902.	Aug. 14, 1903
13	Basil O. Lenoir	Acting as signal officer, Department of the East, Army Building, New York City; duty in the Philippines, May 8, 1901, to Aug. 8, 1902.	Sept. 22, 1903
14	William Mitchell	Signal officer, Department of the Colorado, Denver, Colo.; duty in Alaska, Nov. 10, 1901, to July 27, 1903.	Aug. 24, 1903
15	Henry W. Stamford	Signal Corps Post, Fort Myer, Va.; duty in China, Apr. 27 to May 27, 1901; in the Philippines, June 5 to Sept. 2, 1901.	Feb. 10, 1902
16	Charles S. Wallace	Manila, P. I., as superintendent telegraph division of the Philippines constabulary; under orders to proceed to San Francisco, Cal., to take effect Nov. 1, 1903; in the Philippines since May 24, 1901.	Sept. 29, 1902

No.	Name and rank.	Stations and duties. (Foreign service since appointment as regular officer.	At present station since—
<i>Captains—Continued.</i>			
17	George S. Gibbs.	On detached service in connection with Army maneuvers at West Point, Ky., and Fort Riley, Kans.; duty in Alaska, July 6, 1901, to July 25, 1903.	Sept. 16, 1903
18	Charles DeF. Chandler.	Quartermaster on transport Burnside, serving as cable ship in Alaskan waters; duty in the Philippines, Sept. 26, 1901, to June 10, 1903.	July 6, 1903
<i>First lieutenants.</i>			
1	Herbert J. Brees.	Detailed from Twelfth Cavalry, Sept. 17, 1903, for duty with the Signal Corps; not yet reported.	
2	Richard O. Rickard.	Fort Gibbon, Alaska; duty in the Philippines, May 26, 1901, to Mar. 23, 1902.	
3	Frank E. Lyman, jr.	Signal Corps Post, Fort Myer, Va.; on detached service in connection with Army maneuvers at West Point, Ky., and Fort Riley, Kans.; duty in the Philippines, May 27, 1901, to Nov. 23, 1902.	Feb. 10, 1903
4	Mack K. Cunningham.	Manila, P. I.; in the Philippines since July 23, 1902.	May 2, 1903
5	Alfred T. Clifton.	St. Michael, Alaska; duty in the Philippines, May 26 to Sept. 16, 1901.	Sept 16, 1903
6	Henry S. Hathaway.	Signal Corps Post, Fort Myer, Va.; on detached service in connection with Army maneuvers at West Point, Ky., and Fort Riley, Kans.; duty in the Philippines May 9, 1901, to July 17, 1902.	Dec. 6, 1902
7	Otto B. Grimm.	Manila, P. I.; in the Philippines since July 4, 1902; duty in Alaska July 1, 1901, to Mar. 1, 1902.	July 31, 1903
8	Alvin C. Voris.	Detailed from Eighth Infantry, Sept. 17, 1903, for duty with the Signal Corps. Not yet reported.	
9	George E. Kumpe.	Detailed from Twenty-eighth Infantry, Sept. 17, 1903, for duty with the Signal Corps. Not yet reported.	
10	Gordon Johnston.	Detailed from Fifteenth Cavalry, Sept. 17, 1903, for duty with the Signal Corps. Not yet reported.	
11	E. Alexis Jeunet.	Detailed from First Infantry, Sept. 17, 1903, for duty with the Signal Corps. Not yet reported.	
12	John E. Hemphill.	Detailed from Third Cavalry, Sept. 17, 1903, for duty with the Signal Corps. Not yet reported.	
13	William M. Goodale.	Detailed from Nineteenth Infantry, Sept. 17, 1903, for duty with the Signal Corps. Not yet reported.	
14	Allan L. Briggs.	Detailed from Fourteenth Infantry, Sept. 17, 1903, for duty with the Signal Corps. Not yet reported.	
15	James S. Butler.	Detailed from First Cavalry, Sept. 17, 1903, for duty with the Signal Corps. Not yet reported.	
16	William C. Fitzpatrick.	Detailed from Ninth Infantry, Sept. 17, 1903, for duty with the Signal Corps. Not yet reported.	
17	Vacancy.		
18	Vacancy.		

ON TEMPORARY DUTY WITH THE SIGNAL CORPS.

<i>First lieutenants.</i>			
	Archibald F. Commiskey (Seventh Cavalry).	Manila, P. I.	May 26, 1903
	William W. Bessell (Twenty-sixth Infantry).	Manila, P. L.	Aug. 22, 1902

With 54 per cent of the Corps in the Philippines and 21 per cent in Alaska, and no possibility of relief under the present conditions, it is hoped that the necessity of reorganizing the Corps and enlarging, especially, the number of enlisted men will meet with the approval of the Secretary of War and of Congress.

It is recommended that the enlisted force consist of three battalions of four companies each, each company to have a minimum force of 100 men. There should be one additional colonel to give the Signal Corps the proportion of field officers equal to the minimum accorded any other staff corps of the Army.

The organization should be under the same conditions as those which characterize the admirable organization of the Corps of Engineers.

The condition of the enlisted men in the Philippines, as shown elsewhere, has been deplorable and that of the men in Alaska only less so.

It should be possible to relieve men in the Philippines and in Alaska by the detail of companies, which would guarantee to the men of the Signal Corps the same certainty of equitable service abroad as is granted to other branches of the service, but which indisputably has been denied to the Signal Corps of the Army in the past as impracticable, this despite the favorable action of the Secretary of War.

PHILIPPINE ISLANDS.

The very important Signal Corps duties in the Division of the Philippines have been conducted throughout the year by Maj. William A. Glassford, Signal Corps. It is to be regretted that for some unknown but doubtless sufficient reasons Major Glassford's annual report has not reached this office, so that Signal Corps work on the military telegraph lines, which devolves by law upon the Chief Signal Officer of the Army, is necessarily treated incompletely, the available data consisting of monthly reports from Major Glassford and incidental reports from his subordinates.

At the commencing of the year the Signal Corps telegraph system aggregated 6,434 miles, of which 1,326 miles were submarine cable. The length of the lines under military control has been reduced by transfer to the civil government and by abandonment, so that on June 30, 1903, the aggregate length of the military system was 4,206.7 miles, of which 1,269 miles were submarine cable.

The whole system has rendered possible an effective executive control not only for the Army, but for the civil government, from the north coast of Luzon, southward, to the island of Siassi, within 60 miles of Borneo. The 16 largest and most important islands of the archipelago are connected by cable.

The line extensions have been limited to military necessities as far as the Army is concerned, but on the request and at the expense of the civil government cables have been laid extending from Marinduque through Romblon to Masbate, and from Panay to Palawan.

Owing to the great energy displayed by sergeants of the Signal Corps in charge of repair sections, the land lines have been operated almost uninterruptedly during the entire year. There have been only fifteen cases of malicious interruption, and but one native repairman has been killed, although several others have been maltreated.

Marked improvements in instrumental installations have been adopted, so that cable business between Manila and the southern islands has been handled with unusual dispatch.

The annual report of the chief signal officer of the division not having yet been received, there are no data as to the volume of business handled throughout the whole archipelago, although it continues to be enormous. From other official reports it appears that on the island of Luzon alone there were handled 2,162,435 telegrams. Of these 50.8 per cent pertained to the official business of the War Department; 3.2 to official business of other departments of the United States; 25.5 to the official business of the civil government of the Philippine Islands, while 20.5 were paid commercial messages.

The report of Capt. C. McK. Saltzman, Signal Corps, bears on the military lines in Mindanao, which have been especially important on account of the hostilities of the Moro tribes in the vicinity of Lake Lanao. In the southern part of the department the line between

Reina-Regente and Davao, 210 miles in length, was abandoned, as it was not needed for military purposes. In connection with the Moro hostilities and the institution of garrisons of the Lake Lanao region, a line 25 miles in length has been completed, from Iligan to Pantar, and one 7 miles in length from Tucuran to Lubig, while a line from Malabang to Camp Vicars, about 30 miles in length, has progressed as the road was constructed. In regard to the importance of the military telegrams Captain Saltzman says:

On account of the absence of adequate mail facilities between posts of the department (Mindanao) and the importance of the military operations in the Moro country, the majority of the military telegrams (official) have been of a much greater length than those handled by the commercial companies of the United States and were of greater importance.

Local telephone systems for military purposes have been constructed in Captain Saltzman's department, at Malabang, Cottabato, and Iligan; and on Paragua there has also been built a line of 13 miles, to connect Punta Separacion with Alfonso XIII.

Capt. E. O. Fechet, Signal Corps, reports that in the Department of the Visayas there have been established, for military purposes, at six army stations telephone exchanges aggregating 78 miles in length and using 142 telephones.

Of the enlisted men under him Captain Fechet says:

The men, whether as operators or repairmen, have at all times manifested in a high degree the soldierly qualities of loyalty, endurance, and a brave patience under many privations.

Lieut. M. K. Cunningham, Signal Corps, in reporting on the telegraphic and telephonic systems operated by the Signal Corps in the city of Manila, states that the aggregate on the single conductor basis is 215 miles in length. In connection with the central and two sub-central telephone exchanges there are operated 271 telephones.

During the year there were 262,720 calls, while the service is unusually efficient, as shown by the fact that the "trouble" calls averaged less than five daily.

The report of First Lieut. Charles DeF. Chandler, on the U. S. transport *Burnside*, used a portion of the time as a cable ship, shows that her employment by the Signal Corps covered 93 days, up to June 10, when she sailed for Sitka to lay the Alaskan cable.

The cost of the *Burnside*, as shown by Lieutenant Chandler's report, is as follows: Coal, \$22,068; salaries of officers and crew, \$41,082; food and stewards, \$25,851. This entails a daily expense for the ship upon the Quartermaster's Department of about \$165, which makes the aggregate expenditure, exclusive of repairs, \$15,345 for the 93 days' use of the ship. It demonstrates the economy of using for cable-repair purposes an available transport, rather than resorting to the costly and unreliable plan, recommended during the year, of repairing military cables by ships flying a foreign flag.

In addition to the regular officers of the Signal Corps, the following officers of the line have served on temporary duty in the Signal Corps in the Philippines: First Lieut. Evan H. Humphrey, Seventh Cavalry (now relieved); First Lieut. Frederick M. Jones, Ninth Cavalry (now relieved); First Lieut. Archibald F. Commiskey, Seventh Cavalry; Second Lieut. James A. Higgins, Thirtieth Infantry (now relieved); Second Lieut. William W. Bessell, Twenty-sixth Infantry.

These officers have all performed arduous and valuable services.

TRANSFER OF PHILIPPINE TELEGRAPH LINES.

After consultation with the Hon. William H. Taft, governor of the Philippine Archipelago, and the commanding general, Division of the Philippines, the gradual transfer of the telegraph lines from the control of the Army to the civil government was initiated.

At the request of Governor Taft, Capt. Charles S. Wallace, Signal Corps, has been placed on duty with the civil government, in order to organize an efficient telegraph bureau for civil purposes. Captain Wallace's efforts have proved so satisfactory to the civil government that his original detail, which terminated in April, 1903, has been continued, under repeated requests, until November, 1903.

Under Captain Wallace's supervision marked progress has been made in providing a body of trained natives for duty as telephone and telegraph operators. While it has been necessary to employ many American operators, generally discharged men of the Signal Corps, yet the latest advices from Manila indicate that within the next year or two there will be available quite a force of Filipino operators, capable of handling a telegraph business of moderate volume.

The total amount of lines of cables thus transferred amounts to 56.965 miles, as follows: Maasin, island of Leyte, to Surigao, Mindanao, 55.565 miles; Tacloban, island of Leyte, to Basey, Samar, 1.4 miles. The entire amount of land lines and cables operated by the Philippine constabulary at this date must considerably exceed 2,000 miles in length.

It is gratifying to note that simple methods of transfer have facilitated the ends in view. By direction of the Chief Signal Officer all Signal Corps instruments and supplies desired by the civil government are transferred to them with the lines and offices in the different telegraph sections, it being understood that any question as to compensation, etc., should be settled in Washington between the Chief Signal Officer of the Army and the Chief of the Insular Department.

Recognizing the great difficulties which would beset the civil government in building up in the Philippines a civilian telegraph system, the Chief Signal Officer of the Army has not only extended every cooperation possible in this country by the purchase of supplies, etc., but also has repeatedly enjoined the chief signal officer, Division of the Philippines, to use his utmost efforts in material assistance and in helpful cooperation, to the utmost extent that was consistent with the interests of the Army. It is believed that during the coming fiscal year the transfer of lines will proceed with greater rapidity than has been possible for the civil government to receive lines during the past year.

ENLISTED MEN IN THE PHILIPPINES.

While service in the islands has rested heavily on the Army in general, yet it is safe to say that the most distressing and harassing burdens have been those of the enlisted men of the Signal Corps.

As pointed out by one of the commanding generals of the Philippines, the power of the Army to there preserve peace is practically tripled by the complete and efficient system of intercommunication established and operated by the Signal Corps. Largely through this system great reductions have been possible in the number of troops serving in the Philippines. Instead of two-thirds of the entire forces of

the Army, there is now in the Philippines only about one-fifth. But such reductions have not been possible for the Signal Corps. Despite every effort to transfer lines to the civil government, and although the Secretary of War has twice directed the return at as early a date as practicable of signal corps men having more than two years of island service, no results have followed. At the end of the fiscal year 54 per cent of the enlisted forces of the Signal Corps were still serving in the islands, and fully 15 per cent of the entire corps had there served for periods ranging from two to four years. Despite every effort to tide over the present conditions of affairs, dissatisfaction and demoralization have to some extent resulted.

Statistics compiled last spring show that out of the 1,300 men sent to the Philippine Islands for the Signal Corps only 15, or but 1 out of 100, had been permitted to return to the United States for that change of duty which is recognized as one of the privileges due a faithful American soldier. Under these conditions, it is not astonishing that reenlistments are rare, and that a despondent feeling has come over the enlisted men, due to the realization that they can escape service in the islands only by quitting the Army.

It is recognized that this condition of affairs is due to military necessities, and that the Signal Corps of the Army should perform its duties, however exacting, as should every American soldier. Relief is possible only by an increase in the number of the enlisted men of the service. Of the 810 men now authorized by law, 54 per cent are on duty in the Philippines and 21 per cent in Alaska, leaving only 25 per cent to replace those on foreign service. If the enlisted forces were increased to 1,200 men, as elsewhere recommended, it would be possible to reduce foreign service in the Signal Corps to one year in two, or, perhaps a little later, to one year in three. This certainly should be granted the Signal Corps, in view of the fact that the Army at large now requires but one year's service in four in foreign stations.

In addition to unduly prolonged foreign service, under conditions above stated, the men have the feeling that they are underpaid for the important technical work done by them, an opinion reenforced by the fact that enlisted men, drawing from \$17 to \$30 per month, work often side by side with civilians drawing \$100 to \$125 for exactly the same duties.

Despite these adverse and discouraging conditions the enlisted men of the Signal Corps, frequently isolated at remote and unsanitary places, have adhered to the high standard of previous years and performed their arduous duties, frequently covering from twelve to fourteen hours per day, with cheerfulness, loyalty, and efficiency.

MONEY VALUE IN BUSINESS DONE.

Lack of data makes it impossible to state in detail the value of the telegraphic and telephonic services rendered by the signal corps in the Philippines. Exact data are available only as to the number of separate telegrams handled in the city of Manila, which aggregated during the fiscal year 674,444. It appears from an actual count of 311 official messages on a single day the average length of such messages was 48.5 words. Assuming that one-half of these telegrams passed from one island to another, and applying the extremely low tariff of the Signal Corps (2 cents per word on an island and 4 cents between

two islands), the value of tariffs on these messages amounts to \$981,316.02. The telephone business done in Manila alone, at 10 cents per message, had a tariff value of \$26,272; thus making an aggregate value of \$1,107,588.02.

It seems reasonable to assume that messages in the rest of the archipelago not passing through Manila would amount to at least one-third of the Manila messages, which would make the value of business done by the Signal Corps in the neighborhood of \$1,500,000.

Judging from the Manila business, the forecast made by the Chief Signal Officer in his annual report of last year is approximately correct, that the official business of the War Department would rapidly decrease, while that of the Philippine civil government would materially increase. As determined from the business passing through that city, the War Department messages have decreased from 86 per cent in 1902 to 51 per cent in 1903, while the official business of the civil government of the Philippine Islands has increased from 11.4 per cent to 25.5 per cent.

While complete data for the year have not been received regarding the receipts from commercial business, yet it is safe to say that the amount received exceeds, during the fiscal year, \$50,000. These receipts have been regularly deposited in the treasury of the civil government, in continuance of the plan originally adopted, and under the assumption that these lines were destined for the use of the islands and the civil government, to which they are being gradually transferred.

The entire cost of the Signal Corps, including pay, clothing, rations, transportation, cable-ship expenses, etc., are believed to be well within \$400,000, so that the Signal Corps of the Army has rendered services in the Philippines whose pecuniary value exceeds by more than \$1,000,000 the entire expenses connected with the Corps. This has simply been done by overworking the men of the Signal Corps and by their underpayment, as elsewhere stated.

OPERATIONS IN THE UNITED STATES.

Great as are the interests and extent of work in Alaska and the Philippines, they are equalled in military importance by developments in the United States in connection with fire-control communications for seacoast artillery, electrical installations at posts, and necessary provisions for maneuvers and field camps.

MILITARY DEPARTMENTS.

Under paragraph 1747, Army Regulations, department commanders supplement the operations of the Signal Corps by such instruction in visual military signaling as they deem necessary for the public service. The instruction in the line of the Army contemplates that each independent command should have at least two officers and two enlisted men able to exchange messages in the army and navy code at short distances by day and night.

Deficiency in instruction in military signaling in the line of the Army has resulted largely from the inability of the Signal Corps to furnish a signal officer for each military department. Of the eight military departments in the United States it has been possible to supply only two throughout the year with a signal officer. Line officers, serv-

ing as department signal officers, perform these duties in addition to others having a prior claim. Under these conditions the Signal Corps has been fortunate in obtaining in all cases good service, and in some cases very efficient service. Capt. C. D. Roberts, Seventh Infantry, has most efficiently administered the affairs of the Department of Texas, where, in addition to ordinary duties, three sections of military telegraph lines, aggregating 353 miles in length, have been controlled by him. In the valley of the Rio Grande, the Laredo-Brownsville line, 237 miles in length, has been interrupted only three days and fifteen hours during the entire year. On this line 18,635 messages have been handled, and of the resulting tariffs, \$1,323.56 of "this line" receipts have been deposited in the Treasury of the United States as required by law, while \$612.16 of "other line" receipts have been paid over to the commercial companies to whom it pertains.

In the Department of the Colorado four sections of telegraph lines, aggregating 400 miles in length (excluding the Mammoth-Hellner branch, condemned and to be transferred or sold), have been maintained during the year in New Mexico and Arizona, as also a line of 87 miles between Price and Fort Duchesne, Utah. On these lines 31,316 messages have been transmitted. "This line" receipts of \$1,039.34 have been turned into the Treasury, while "other line" receipts to the amount of \$3,888.72 have been turned over to the commercial companies to which they belong.

It is hoped that in the early future it will be possible to sell or abandon the Arizona line between Holbrook and Willcox, which has been maintained during a series of years as an alternate route valuable in case of Indian depredations.

The inability to obtain a signal officer of rank for the Department of the Columbia has devolved the duties of this department, as regards Alaska, very largely upon the office of the Chief Signal Officer. During a portion of the year Capt. Walter L. Clarke, Signal Corps, was in charge of the department signal office.

The duties of signal officer of the Department of the East have been performed by Col. H. H. C. Dunwoody, Signal Corps, who, in addition to the ordinary work of the department, had charge of the important supply depot in New York City, and also the direction of signal corps operations during the Army and Navy maneuvers in the Portland artillery district.

The great importance of fire-control installations in the Department of the East has necessitated the detail of an assistant to Colonel Dunwoody. Permission being granted to quarter a detachment of the Signal Corps at Fort Trumbull, New London, such a detachment has been there located under Capt. Basil O. Lenoir, Signal Corps. It is contemplated that Fort Trumbull shall serve as a cable-repair depot for the maintenance of fire-control cables along the Atlantic coast, and the installation of such others as may be necessary. Unfortunately the Quartermaster's Department has been unable to furnish a suitable cable boat for repair work, but has taken prompt steps to remedy the situation by constructing a boat which shall serve as a cable-repair boat and as a quartermaster's boat. Tanks suitable for storing surplus cable will be installed at Fort Trumbull as soon as funds are available for such purpose.

As pointed out elsewhere in this report, it has been impossible for the Signal Corps to secure cable necessary for the Army and Navy

maneuvers at Portland, six of the eight cable companies in the country declining to bid, owing to their inability to fill orders from their regular customers. The cable laid at the request of the artillery corps between New London and Fort Michie has been interrupted since the middle of December, 1902, through inability to have cable manufactured for repair purposes. Propositions have been made looking to the utilization of some of the torpedo cable at Fort Slocum, but the Chief Signal Officer of the Army declined to favor any such plan, owing to the inferior character of this cable, which, as stated elsewhere, failed electrically in the maneuvers in the Portland district.

The success of coast-defense operations may be imperiled at a critical period by an inferior fire-control system, and neither the Army nor the nation can afford to countenance any service which does not utilize the best material and the best talent. This service is necessarily tentative and in its early stages, the first system of fire-control cables having been established at the instance of the Chief Signal Officer of the Army in New York Harbor at the beginning of the Spanish-American war. Improvements and advances must be insisted upon, and it is believed that the electrical system originated and developed by the Signal Corps is steadily moving toward a high standard, which the American nation has a right to demand for its honor and safety in time of war.

In view of the fact that in six months' time there could not be secured from cable manufacturers of the United States one-sixth of the cable necessary for use in time of peace, the Chief Signal Officer of the Army deems it most important to point out this fact for the information of the Secretary of War and of Congress. At a seasonable time the question of a special estimate for suitable reserve of submarine cables for war purposes will be brought to the attention of the Secretary of War.

SIGNAL CORPS POST, FORT MYER, VA.

The command of this important post and school of instruction has been exercised by Lieut. Col. Richard E. Thompson, Signal Corps, during the entire year.

The primary function of the post is the instruction of untrained officers and men, while secondarily it serves as a depot of repairs and issue. Its value as a school of instruction is shown by the fact that 178 enlisted or transferred men have joined during the year. There have been trained and sent to foreign service 74 enlisted men, while 89 others, having received preliminary training, have been sent as assistants to telegraph and signal stations in Arizona, Utah, and elsewhere. The necessities of the service have reduced the period of instruction to four and one-half months, too limited time for proper training. The excellent quality of the recruits and character of the garrison is shown by the fact that, despite the unpleasant surroundings that have grown up since the canteen system was modified, there has been during the past year but 1 trial by court-martial and 19 by summary court.

Very large quantities of surplus and unserviceable signal property have been received at the post. No less than 332 tons of supplies and material have been shipped from the post. The transportation facilities are inadequate, as all supplies to and from the post have to be hauled 6 miles each way by wagon. It is hoped that accommodations may soon be provided for signal corps companies at Fort Leavenworth.

worth and San Francisco, when subdepots will be established in the interests of economy and efficiency.

There have been eleven officers at the post, of whom no less than eight were in need of military and professional training. Unfortunately it has been impossible, owing to the great scarcity of officers, to furnish the technical instruction for the officers at the post, the commanding officer being unable to do more than supervise military instruction pure and simple, and instruction of officers has necessarily been suspended, much to the injury of the service and to the detriment of the individual officers.

The relations of the two independent posts at Fort Myer—the cavalry and the signal corps posts—have been most harmonious, Colonel Edgerly having invariably cooperated with Colonel Thompson in all matters affecting the interests of both posts.

AUTOMOBILES.

In view of the prospective value of auto-propelled vehicles to telegraph and balloon trains the Chief Signal Officer of the Army has continued experiments with automobiles. The Signal Corps' experiences have demonstrated the practicability of self-propelled vehicles for such military purposes. While the good points of electric and steam vehicles are thoroughly recognized, yet the internal combustion type, using kerosene or other oil, seems preferable for war purposes. This type has especially valuable features from a military standpoint in its small fuel and water consumption, essential qualities to any army in the field. It may be added that experiments in foreign services confirm the experience of the Signal Corps as to the advisability of using auto-propelled vehicles for special military purposes.

BALLOONING.

It has been impossible to do any ballooning work during the past year.

First, there were neither men nor officers available for this purpose.

Second, repeated efforts in the form of applications to forty or more firms in the United States disclosed the inability of the Signal Corps to obtain from private manufacturers compressed hydrogen gas, which is absolutely necessary for rapid and successful aeronautical work with captive balloons.

With additional officers obtained by detail under the law, it is hoped that some advance may be made in placing this important military work in a condition of efficiency during the coming year. It now seems certain that a permanent plant for making and compressing hydrogen gas will be necessary for successful work.

WIRELESS TELEGRAPHY.

The system of wireless telegraphy devised by the Signal Corps of the Army in 1899 has been improved in details, but its range of operation is limited. It was deemed advisable to stop experimental work along these lines pending the development of this science by experts in civil life.

In 1901, however, it became a matter of practical importance to the Signal Corps to establish wireless telegraphy over extended distances.

A contract was made looking to the establishment of the wireless telegraph by the Fessenden system across Norton Sound from Nome (Fort Davis) to St. Michael, about 110 miles. The contractors failed, however, to make the installation and the contract was revoked.

In view of the failure of the contractor to install the wireless system across Norton Sound, and in order to meet the desire of the commanding general, Department of the Columbia, for telegraphic communication with Fort Davis, the Signal Corps has taken up this problem and is now engaged in an effort to install a system that shall work from St. Michael to Safety Harbor, near Nome, Alaska, a distance of about 105 miles. Experimental work with separate and composite systems is being carried on in Long Island Sound by Capt. L. D. Wildman, Signal Corps, with a view to eventually working between Fort Schuyler and Fort H. G. Wright, a distance of 105 miles, and of which about 10 miles are lowland. For this purpose masts 140 feet high have been constructed, and Captain Wildman now awaits special motor dynamos and transformers to be completed in order to make final tests.

Meanwhile, installation of masts and antennæ are now being made at Safety Harbor and St. Michael, so that whatever system proves satisfactory in Long Island Sound can be utilized in Alaska in 1904 by the transfer thereto of suitable sending and receiving apparatus. At both St. Michael and Safety Harbor the permanent plants are now in process of transportation and erection. There are to be at each station two triple masts 200 feet high, between which are to be suspended fan-shaped antennæ, consisting of 125 copper wires 1 foot apart. The motor power is to consist of a 5-horsepower gasoline engine and a 3-kilowatt motor dynamo, 60-cycle alternator. At one station will be a transformer "stepping up" from 500 to 20,000 volts, and at the other "stepping up" from 500 to 25,000. The large Muirhead receivers, which now seem to be the best available type, are to be utilized in this work unless meantime other experiments produce something superior.

Another contract was made with the American-Marconi Wireless Telegraph Company to establish wireless communication between two points in the Tanana valley, where great difficulties were expected in constructing an ordinary telegraph line and in maintaining it satisfactorily, the contract looking to the connecting of two points about 164 miles apart with an intermediate station should the Marconi company so decide. It was hoped that this installation would be made by October, 1902, but the contractors were not able to install the system last year. They were at work during the summer of 1903, but to this date no success has been reported. It has, therefore, been necessary for the Chief Signal Officer of the Army to direct the efficient maintenance of the land lines in the lower valley of the Tanana, such action being imperatively necessary in view of the failure to make wireless installations in a reasonable time.

As was stated in last annual report, the De Forest system of wireless telegraphy was utilized during the army and navy maneuvers on Long Island Sound. This year the same system has been used to replace a broken cable in New York Harbor, between Forts Wadsworth and Hancock, and it has worked most satisfactorily over this distance of 12 miles. In this system a motor dynamo of 1 kilowatt capacity, driven by the power of the post plant at 110 volts, produces an alternating current of 500 volts at 60 cycles. This runs through a

2-kilowatt transformer, which "steps up" the voltage to 25,000 across the spark gap. Messages are received by the telephone and De Forest responder.

INTERNATIONAL WIRELESS CONFERENCE.

On the recommendation of the Secretary of War and by appointment from the Secretary of State the Chief Signal Officer of the Army attended the preliminary international conference for the regulation of wireless telegraphy, which was held at Berlin, Germany, from August 4 to 15, 1903. The proceedings of this conference have formed the subject of special reports by the Chief Signal Officer of the Army, both to the Secretary of War and the Secretary of State.

In general it may be stated that the regulations proposed view wireless telegraphy as simply a continuation of ordinary telegraphy. Under the decisions of the Supreme Court of the United States telegraph companies are common carriers, and the regulations suggested look to the application of the same rules of duty and liability to wireless telegraph companies which now apply to ordinary telegraph and cable companies. These views are believed to be in harmony with the temper of American thought and with the trend of American legislation.

INTERNATIONAL TELEGRAPH CONFERENCE.

Although the United States is not an adhering party to the International Telegraph Union, yet the Government of Great Britain invited this country to be represented at the International Telegraph Conference held in London from May 27 to July 3, 1903. On the recommendation of the Secretary of War and by the appointment of the Secretary of State, the Chief Signal Officer of the Army represented alone the interests of the United States. The conditions under which this duty was carried out were somewhat difficult, not alone owing to the fact that the proceedings were all conducted in a foreign tongue, but that the Chief Signal Officer as a delegate from the United States had no vote, his participation being with the distinct understanding that the United States incurred no obligations thereby.

The cause which decided the United States to be represented at this convention was the alarm felt by the commercial and industrial interests of this country regarding the proposed enforcement of an official vocabulary on the world at large. It was proposed and urged at the conference that this vocabulary, consisting of about 400,000 words, should be the source whence all code words should be drawn. If this vocabulary had been adopted it would have necessitated the reconstruction of practically every private telegraph code in the United States, and would have involved not only large sums of money to reconstruct the codes, but would have very seriously interfered with the transaction of business by cable in other countries.

Most fortunately the existent relations between the leading cable companies of the world and the Signal Corps of the Army were so harmonious that the representatives of these corporations, who were present without a vote, cooperated as fully as was possible with the opinions put forth formally by the Chief Signal Officer of the Army in his memoir to the convention at large on this subject.

No opportunities were lost to determine the attitude of the official

delegates from the various countries and to urge on them the inadvisability of an obligatory vocabulary. The representatives of the Government of Great Britain were heartily in accord with the American issues, and to the assiduity and ability of the British delegation are largely due the successful issues of the convention.

Not only was the obligatory vocabulary withdrawn, but the regulations regarding cipher messages and code words have been extended to such a point as to meet, it is believed, any and all demands of American interests. The results could not possibly have been more successful.

It is most strongly urged that steps be taken by the United States to adhere to the International Telegraph Union. American interests may be threatened in future conventions, and without a vote the time may come when results detrimental to this country may ensue unless the United States participates therein.

As compared with the contracting states, the United States is now at a disadvantage in the use of cables and land lines which pertain to the union. In time of war or in serious exigencies the United States has to yield in priority to the official messages of agents of all contracting states, as under the regulations telegrams of contracting states take precedence.

The International Telegraph Union furnishes the contracting States gratuitously all information relative to international telegraphy, such as interruptions, restorations, etc., and the United States has been obliged for years past to obtain such valuable information secondhand and as a favor, if at all. The expense of the maintenance of the International Bureau is borne by the different States, and would probably not exceed a few hundred dollars per year for the United States. The amount could be paid from the telegraphic appropriations of the Signal Corps if authority be given, or the expense could be met, as in other countries, by the additional charge of 1 cent on each message over the United States lines, as was regularly done in Cuba and Porto Rico prior to 1898 and is now done in the Philippines.

SIGNAL CORPS OF THE NATIONAL GUARD.

The importance of electrical communications has been very generally recognized in the organized militia of the United States. There exist, as shown by the last militia report of the War Department, Signal Corps organizations with commissioned officers and enlisted men in the States of California, Colorado, Connecticut, Illinois, Indiana, Louisiana, Maine, Massachusetts, New Jersey, New York, Ohio, Texas, and Utah, and the Territory of New Mexico and the District of Columbia. Detachments under noncommissioned officers have also been organized in Iowa, Maryland, New Hampshire, and Rhode Island, and in the Territory of Arizona.

The relations of the Signal Corps of the Army with the signal organizations of the National Guard of the States have been cordial and harmonious.

TELEGRAPH AND CIPHER BUREAU OF THE WHITE HOUSE.

The telegraph and cipher bureau of the White House to place the Commander in Chief of the Army and Navy in quick and direct com-

munication with military forces on land and sea, and with our diplomatic representatives abroad, has remained under the immediate and efficient supervision of Maj. Benjamin F. Montgomery, captain, Signal Corps, whose war services have been recognized by Congress in giving him advanced rank while so serving.

FIRE-CONTROL SYSTEM FOR SEACOAST ARTILLERY.

In fire control operations the utmost harmony and thorough cooperation have obtained throughout the year between this Office, the Chief of Artillery, the Chief of Engineers, and the Chief of Ordnance.

It is recognized that the Corps of Artillery is the dominant factor in the operation of our seacoast defenses, and that the system of fire control must be such as to commend itself to the far greater majority of the officers of the Artillery Corps as a thoroughly reliable system, capable of satisfactory operation by the enlisted men of the Artillery Corps. The Chief Signal Officer also announced his opinion that no iron-clad system would ever prove satisfactory, but that it must be flexible and capable of modification according to the varying physical environments of the different fortifications. Especially it should be as simple as possible, and modifications in that direction have been invariably favored by the Chief Signal Officer.

The Signal Corps is not charged with problems of designs for artillery instruments, and the Chief Signal Officer of the Army has informed the Chief of Artillery that he is willing to take up the problem of electrical installation for the fire-control system of any post in such manner as would seem to the Chief of Artillery most promising in practical results. This is to be done either on plans and specifications drawn by the artillery, or indeed any other branch of the service, or to work out the problem independently on being advised as to the ends desired. In the former case the Signal Corps could not, of course, be held responsible for the efficient working of any system devised by any other corps, only being bound to deliver instruments of first-class workmanship and material, as might be required by the sample instrument furnished or the specifications filed.

The Chief of Artillery and, indeed, most of the officers of the Artillery Corps charged with important fire-control work take broad views of the situation. Almost invariably they have simply enunciated to the Signal Corps the kind and character of work to be done by the instruments and left the solution of the electrical problem to the Signal Corps. This method, it is believed, has produced results more satisfactory and speedy than could have been otherwise obtained.

The appropriations are spent in accordance with the requests of the Chief of Artillery, whose wishes as regards the order in which installations shall be made at different posts have always been followed.

While the Chief Signal Officer of the Army in considering fire-control matters has consistently sought the advice of the expert electricians among the officers of the Signal Corps, yet the burden of the work has fallen upon Capt. Edgar Russel, assistant in charge of the Electrical Division of this office. His ripe experiences of seven years as an officer of artillery, supplemented by three years' experience in the Philippines, make him especially competent to apply his theoretical knowledge of electricity to novel and important operations. Captain Russel formulates specifications, makes the official tests, and prepares the instruc-

tions for the use of the various instruments and material, of which the most important are the armored cables, master clocks, service telephones, and telautographs.

The electrical installation of the coast defenses of the United States will cost eventually in the neighborhood of \$2,000,000, and in time its minimum annual maintenance must cost at the very least \$200,000, figuring the deterioration of the electrical plant at 10 per cent. Telautographs, master clocks, special telephones, switches, and batteries are certain to deteriorate very rapidly unless properly cared for. The proper supervision of these expensive and elaborate electrical plants will prevent what otherwise will be an enormous waste in the years to come. At present the Signal Corps of the Army has no part in the supervision or inspection of these installations, which become part of the artillery plant as soon as installed and turned over in good order.

While under existing law and regulations the Signal Corps is charged with electrical communication for fire-control purposes and electrical installations at posts, there have been modifications and limitations which the Chief Signal Officer of the Army has not thought proper to question, nor does he now do so. Inevitably the duties of various departments cross one another at certain points, but as far as the Signal Corps is concerned there is every desire to avoid clashing and to seek only the interests of the Army and of the country.

It might be borne in mind that the various duties in the past have made the Signal Corps of the Army unusually well skilled in electrical work. The tendency of the times is to specialities, and past experiences demonstrate the difficulty of bringing together all-round men competent for the many separate phases of practical electrical work necessary for the Army.

There is no question that the officers of the Artillery Corps, of the Corps of Engineers, or of the Ordnance Department could perform these varied duties as well as officers of the Signal Corps, but to do so necessarily entails a vast amount of study and training outside of the ordinary duties pursued by these officers. It is a question of coordinating the work where it can be most speedily brought to a degree of perfection in keeping with the high standard of the American Army.

This report elsewhere demonstrates the economy and efficiency of the Signal Corps in its electrical work in the Philippines. It is believed that a slight extension of its enlisted force would enable the Signal Corps to perform its electrical work, in connection with the coast defenses, more economically than could be done in any other way.

It is a question between doing this work economically by enlisted men and subordinate officers, or by a host of high-priced civilians. Despite its unusually broad field of electrical work, the Signal Corps of the Army has now in its employ only four civilians drawing a larger salary than \$1,800 per year. Careful training, as well as practical work, have brought many of the first-class sergeants of the Signal Corps to a high electrical standard, considered from the standpoint of practicality.

Doubtless these questions will receive such consideration in the early future as their importance demands, especially as in an official communication the Chief of Artillery, who, both from technical training and official position, speaks with authority, says:

Attention is invited to the fact that a battery of guns without a range finder, or without an adequate means of fire control loses 75 per cent of its efficiency.

The equipment of any attacking squadron is certain to be perfect as regards both its systems of communication. While the internal system is one of vital importance for fire-control purposes, it should be pointed out that the British navy considers the external system of such importance that some of the battle ships have a signal staff exceeding thirty.

If it should be eventually decided to divorce the fire-control work entirely from the Signal Corps, there must necessarily be a duplicate equipment provided both on the Atlantic and Pacific coasts for the installation and repair of fire-control submarine cables, which are now cared for by the paraphernalia and equipments which are absolutely necessary for the maintenance of the military cables of the Army.

These now aggregate several thousand miles as against about 100 miles for fire-control uses. Of course no action can be taken without changing the organic law, which specifically devolves on the Signal Corps the "construction, repair, and operation of military telegraph lines, and the duty of collecting and transmitting information for the Army by telegraph or otherwise."

ARMY AND NAVY MANEUVERS IN PORTLAND ARTILLERY DISTRICT.

Harassed by lack of officers and men, and unable to purchase suitable material, the installation of fire-control communications in the Portland artillery district has been the most difficult task ever set the Signal Corps of the Army. It was only by extraordinary resourcefulness and attention to duty that this installation was made successful. Despite forebodings and prognostications, the Signal Corps' installation was in time for the maneuvers, and produced results which can be criticised only in trifling respects.

The trained electrical officers of the Signal Corps were on duty elsewhere, either managing the undermanned lines of the Philippines or in arranging for the installation of the Alaskan cable, so that it should be in operation at the very early date so earnestly desired by the Secretary of War. First Lieut. Henry S. Hathaway, Signal Corps, skilled in electrical work, surrendered a sick leave of absence and undertook the installation.

The Chief Signal Officer of the Army was notified on February 29 that the Army and Navy maneuvers would take place in the Portland artillery district. He immediately ordered Capt. Edgar Russel, Signal Corps, with electrical engineers, to visit Portland and determine what material and supplies were needed to carry out the fire-control scheme for this district which had been approved by the Chief of Artillery. On March 28 the Signal Corps had done all that was possible to insure the success of the installation. In twenty-nine days it had surveyed the district, laid out the lines of operation, drawn up detailed specifications for cables and other electrical devices, and put out proposals for their construction and delivery in accordance with law.

Unfortunately for the Army, although fortunately for the country, the condition of industry was such that out of the eight largest cable companies in the country only two were willing to bid, the others declining on account of pressure of private orders. The only thing that could be done was to accept bids from two companies which guaranteed to deliver the necessary cable in New York City, but not until

the 11th of July, a little over a month before the beginning of the maneuvers.

Pressure of other orders and the disturbed condition of the labor market are believed to be the causes which made it impracticable for either company to deliver its cables on time. In fact it proved impossible to have delivered by regular methods, in five months' time, even a quarter of the amount of cable necessary for the success of the maneuvers. About 600 miles reduced to the one-conductor basis were needed, but only about 125 could be obtained from regular sources. It was only by extraordinary means that these difficulties were overcome. By paying a higher price and taking cables not standard, about 30 miles of cables on a single-conductor basis were obtained from the only cable company in the country that had on hand any class of submarine cable which could be armored and utilized. Every foot of cable that was surplus at any other post on the Atlantic coast was promptly diverted from its original destination to the Portland district. Finally, about 80 miles of cable were replaced by a four-twisted pair telephone line which the New England Telephone Company contracted to build especially for use during the maneuvers.

Despite every expedient about 80 miles of cable on a single conductor basis was needed to perfect the system as extended and desired by the Corps of Artillery. For this purpose, and as a final resort, the best possible coils that could be obtained from the old torpedo cable at Fort Totten were delivered to the Signal Corps by direction of General Chaffee, in hopes that it might serve the purpose. The misgivings regarding this cable, which in any event could not have been used in compound circuit, were justified by the conclusions, for the torpedo cable deteriorated rapidly and finally utterly failed.

It can not be too strongly urged that special appropriations should be made for the purchase and storage of surplus war materials, such as submarine cables, which can not be purchased in open market, but have to be made to order. The bitter experiences of the Spanish-American war are now reenforced by the experiences of the Army and Navy maneuvers of this year, proving conclusively the inability of the Army to depend on the industrial establishments of the country in times of prosperity for speedy delivery of electrical material. As an indication of the situation it is to be pointed out that the important four-conductor cable serving the artillery district of New London, has been interrupted for a period of five months or more, during which time it has been impossible to have manufactured enough cable for the repairs.

Under Colonel Dunwoody's skillful administration the wireless telegraph system of the Army did admirable work, not only transmitting its own messages uninterruptedly, but intercepting many messages from the wireless service of the Navy.

There being no other available officer for visual signaling, Capt. D. J. Carr, the disbursing officer of the Signal Corps, was detached for service in the Portland district. Though working with a force consisting largely of invalids and recruits, yet the telegraphic work and visual signaling were successfully carried out, although this would have been impossible had it not been for the Signal Corps' detachments from Maine, Massachusetts, and New York.

Capt. Leonard D. Wildman was also detached from the Office of the Chief Signal Officer for service connected with the electrical duties

during the maneuvers, necessarily abandoning other special important work connected with the Alaskan system with which he was then charged.

In this cooperation not only was every available Signal Corps man in the country sent to Portland, but every officer detached from the Office of the Chief Signal Officer except the one in charge.

WAR DEPARTMENT TELEGRAPHIC CODE.

Under paragraph 1741, Army Regulations, the Chief Signal Officer of the Army is charged with the preparation, distribution, and revision of the War Department Telegraphic Code. The extraordinary telegraphic expenses of the War Department in late years make this work economically important.

The preparation of this code has devolved upon the Chief Signal Officer personally, as there was no other available officer having combined knowledge of telegraphy, military usages, special vocabularies, and the commercial cable regulations of the world.

Care has been taken to omit words which, either in continental code or American Morse, are of such telegraphic character as to lead to errors, whether in the transmission or from defective transcription. The War Department telegraphic code is supplemented by the Western Union telegraphic code, and from time to time appendixes have been issued. It includes about 25,000 sentences that are frequently used in military correspondence. On an average, each cipher word represents about seven words in plain text.

Specially prepared tables reduce the length of official messages to a minimum. In connection with certain classes of business a single word acknowledges the messages and conveys to the sender the action taken thereon. Nearly every officer in the Army has a single code word assigned to him, and the same course is followed with each separate military organization.

Primarily a code for economy, the War Department telegraphic code is also available for enciphering confidential messages. Each code word has a number, so that any method of enciphering by key numbers can be used.

The Chief Signal Officer of the Army has awaited the completion of the reorganization of the Army before perfecting the much needed revision of the code, whereby a still larger saving can be made in telegraphic expenses. In the revision every officer of the Army will be given a code word and special study will be made of frequently recurring phrases. Much has already been done in this direction, but the revision could not be perfected until the personnel of the commissioned force of the Army was definitely known.

COAST SIGNAL STATIONS.

It is a matter of the utmost importance that signaling apparatus of a suitable character be installed at the more important of the artillery defenses along the Atlantic and Pacific coasts, so that it may be possible for intercommunication to take place between the Army and the Navy. At present there are no suitable means of communication. It is believed that speedy action is advisable in order to insure that efficiency and extended cooperation between the Army and the Navy of

the United States which, so advisable for practice and maneuvers in time of peace, might be essential to the safety of the Union at a critical period in time of war.

At a suitable time detailed estimates to the end in view will be submitted to the Secretary of War for his consideration.

OFFICE OF THE CHIEF SIGNAL OFFICER.

The most approved methods of handling the immense volume of papers in the office of the Chief Signal Officer have been adopted, but the allotted clerical force is inadequate for handling with dispatch and efficiency the large amount of work devolving upon the Corps. Not only has the Signal Corps been increased within the past five years from a force of 10 officers and 50 men to 46 officers and 810 men, but the annual appropriations incident on extended work have been increased from \$18,000 to nearly \$1,000,000. The placing of the coast defenses in a proper state of efficiency necessarily involves a great amount of work connected with the electrical communications at the various artillery posts.

The following clerical force is considered absolutely necessary for prompt and satisfactory transaction of public business:

One chief clerk	\$2,250
One chief of disbursing division	2,000
Three clerks, class 4	5,400
Three clerks, class 3	4,800
Four clerks, class 2	5,600
Eight clerks, class 1	9,600
Six clerks, at \$1,000	6,000
Two clerks, at \$900	1,800
One messenger	840
Two assistant messengers, at \$720	1,440
One laborer	660

A reorganization of the Signal Office into five divisions has coordinated and harmonized current methods of conducting public business and increasing the amount of work possible for each clerk.

ADMINISTRATIVE DIVISION.

The administrative division has charge of the routine work of the Signal Office—the mail, general office correspondence, the office files, and all matters affecting the commissioned, enlisted, and civilian force of the Signal Corps. This division, with an inadequate clerical force, has by assiduity and system handled over 200,000 letters and communications during the year, the record for the six months ending June 30, 1903, being 107,555.

To this division is assigned the principal assistant of the Chief Signal Officer, Maj. George P. Scriven, Signal Corps, whose long and distinguished service abroad in the field, in China, Cuba, and the Philippines, has made his services most valuable.

DISBURSING DIVISION.

This division is charged with the preparation of estimates for appropriations by Congress; accounts, requisitions and transfers from appropriations, quotations, samples and advertisements, abstracting bids, making awards, placing orders, inspection, shipment, invoicing

and accounting of supplies, payment of accounts, collecting of bills, and all other duties pertaining to disbursements. The duties of disbursing officer has been performed most efficiently and promptly by Capt. D. J. Carr, Signal Corps.

Captain Carr's report shows that in the regular inspection of his accounts no errors have been found during the year and no disallowances have been made by the Auditor for the War Department. These facts show the high character of the work done in this division and the care and intelligence displayed by Captain Carr.

In urging a much-needed increase in clerical force, Captain Carr reports that his five clerks, of whom three were new, have handled 92,853 papers during the year. The introduction of the card system has greatly facilitated the work, which has been possible, however, only by the failure of the clerks to take all leave to which they were entitled and by unremitting attention while on duty.

The disbursements for the year, \$709,517.20, exceed those of any preceding year except one, and are greater than during the year of the Spanish-American war. The work of this division has been enormously increased by strict compliance with the laws and regulations regarding advertisements, awards, contracts, etc. The policy of making local purchases has been followed as far as practicable, being, in many instances, an economy of time and money.

ELECTRICAL DIVISION.

It has been fortunate that in a formative period of electrical installations in the Army, this division has been under the charge of Capt. Edgar Russel, Signal Corps. The most important work has been the designing, testing, and inspecting of electrical instruments and of subterranean and submarine cables. In connection therewith many important experiments have been necessary in order to determine what electrical appliances, under complex conditions of fire-control installations, would furnish the most efficient and economical service. In this connection Captain Russel says:

Extensive tests have been made to determine the best kinds of batteries, instruments, and material. The instruments issued have been carefully checked, obviating, in several important cases, the issue of false standards, which would have vitiated the measurements and caused great trouble.

As an example of the value of such theoretical and practical consideration may be mentioned the complete circuits now (lately) put in in the Portland district. Through experiments in the testing room the proper arrangement of choke coils, etc., was determined so that a telegraphic clock or bell circuit could be placed upon the same metallic circuit with a telephone. About 40 per cent of the conductors necessary in the long submarine cables were thus saved, the economy in this district alone amounting to about \$15,000.

It became necessary, in default of officers, to supplement the commissioned force of the Signal Corps by a suitable organization of electrical engineers and other expert assistants. Through the cooperation of the United States Civil Service most satisfactory employees have been obtained after competitive examination and certification. Of these there are now employed two electrical engineers, five assistant electrical engineers, two electrical assistants, a draftsman, an electrical-instrument maker, and a skilled laborer. The two electrical engineers, Townsend Wolcott and R. A. Klock, are men of unusual professional ability, with which are conjoined qualities of adaptability and resourcefulness.

In addition to important experimental work in the Signal Office, Captain Russel made, through the courtesy of the Safety Insulated Wire and Cable Company, of New York, and of the Simplex Electrical Company, of Boston, valuable experiments on the various rubber compounds used as insulators of submarine and other cables. These experiments indicate that the higher insulation resistances correspond to increased percentages of Para rubber, that the mineral ingredients give mechanical strength with falling off of elongation, and that the Signal Corps' standard of 40 per cent of Para rubber appears to combine in the greatest degree desirable mechanical and electrical qualities. The length of vulcanization for producing the best insulation resistances was not conclusively determined.

EXAMINING DIVISION.

All accounts and returns from officers of the Army have been promptly rendered, fully examined, and are generally in a satisfactory condition. As far as the action of this division is concerned, all accounts have been forwarded to the Auditor within the time specified by law. The excellent state of work in the examining division is indicated by the fact that every application for certificate of indebtedness has been answered the day of its receipt in the division, thus expediting the settlement of claims of exofficers and heirs.

TELEGRAPH DIVISION.

Under the direction, first of Capt. Edgar Russel, and later of Capt. Leonard D. Wildman, Signal Corps, the work of this division has been kept up to date, despite the enormous increase in the volume of new business caused by the increase of the Alaskan telegraph lines.

An improved card record device, by Mr. J. B. L. Hickerson, an efficient clerk, has greatly facilitated work of the division, both in connection with the reports and accounts of telegraph officers, and also in handling the large number of requisitions which come to this division for action and completion.

ESTIMATES AND EXPENDITURES.

For the purpose of coordination, the estimates of the Signal Corps for the fiscal year ending June 30, 1905, have been divided into two parts—one covering the Signal Corps proper for the army bill and the other fire-control installation in coast defenses for the fortification bill.

The estimates for the army bill aggregate \$530,080, being a decrease of \$114,920 as compared with appropriations for similar purposes for the fiscal year ending June 30, 1904.

The estimates for the Signal Corps proper cover two items—the first for the general work of the corps, amounting to \$208,500. The small increase of \$48,500 is necessitated by the addition of 2,000 miles of land lines and cables in the past year, which can not be maintained efficiently without this appropriation. The second item, for the continuance of the Alaskan cable system, amounts to \$321,580. There was appropriated for Alaskan cables during the present year the sum of \$485,000.

This item of \$321,580 for the purchase, installation, operation, and

maintenance of a submarine cable for connecting the headquarters Department of the Columbia with military garrisons in Alaska, said cable to extend from Sitka, Alaska, to Fort Lisicum, Alaska, is necessary to connect the western Alaskan military telegraph section, of 1,619 miles, with the eastern section of 1,500 miles, and make it a homogeneous system, extending from Nome, Alaska, to Seattle, Wash. It will give the United States direct telegraphic control of Alaska, independent of the Canadian telegraph lines, over which all military messages are now necessarily transmitted to and from the western military telegraph section, 1,619 miles in extent.

The estimates for the fire-control installation in coast defenses for the fortification bill aggregates \$1,024,794. This item is made up as follows:

Installations at 438 emplacements, at \$2,113 each	\$925, 494
Repairs and improvements of fire-control installations already established ..	68, 300
Salaries of electrical experts, engineers, and other necessary employees ..	31, 000
	<hr/>
	1, 024, 794

This is an increase of \$635,794 over the amount appropriated for this purpose during the fiscal year ending June 30, 1904. The number of emplacements and the estimated cost of the installation of each are based upon the statement of the Chief of Artillery that this amount will be required for the proper installation of the artillery fire-control system during the fiscal year ending June 30, 1905. The item of \$68,300 is 10 per cent of the value of fire-control systems already installed, and is considered reasonable for the necessary repairs and improvements to the electrical apparatus used in this service. The amount of \$31,000 is a reasonable compensation for the electrical experts, engineers, and other necessary employees required to cooperate with officers of the Signal Corps in the inspection and installation of wires, cables, and other necessary electrical apparatus and instruments required in the fire-control system.

There has been no appreciable reduction of expenses in the Philippine Islands during the fiscal year, and the demands upon the Signal Corps for service have continued. In view of this condition no reduction therefor is made in estimates for cost of operations during the fiscal year ending June 30, 1905.

There has been no noticeable improvement in the facilities for obtaining electrical appliances in the Philippine Islands, either as regards quantities or prices, and the policy of the Chief Signal Officer in maintaining liberal supplies for the reconstruction and equipment of military telegraph and telephone lines must necessarily continue until a market commensurate with the demand is to be had at Manila.

UNITED STATES ARMY AND WAR DEPARTMENT LIBRARY.

This library is an important auxiliary to the educational needs of the service wherever army officers can be conveniently reached by mail, the more extended circulation being authorized by General Orders, No. 21, War Department, Adjutant-General's Office, series of 1894.

By a direct order of the Secretary of War in 1893, the library was placed under the supervision of the Chief Signal Officer of the Army, he being charged with the general supervision of the library work.

The labors of the Chief Signal Officer of the Army have been greatly lightened by the efficient services of the librarian, Mr. James W. Cheney.

Within the past ten years the number of volumes has been doubled, while the general usefulness of the collection has increased in still greater proportion.

Professional publications only are purchased for the library, including, besides strictly military publications, history, geography, administration, and kindred subjects of importance to the War Department and the Army. Especial attention has been paid, since the beginning of the Spanish war, to works treating of Cuba, colonial administration, China, Japan, Porto Rico, and the Philippines.

The total number of books in the library proper, excluding duplicates, on June 30, 1903, is estimated at 47,550. The accessions for fiscal year 1902-3 were divided as follows: Purchases, 795; exchange, 358, under the law of January 12, 1895; donations, 1,397. The loans to army officers and Department employees during the year were 16,600. The number of books consulted during the year was 7,900.

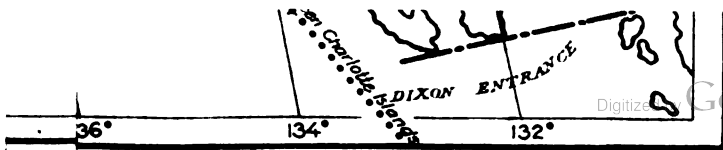
For historical and technical reference this library is often visited by authors and consulting students, who appreciate its valuable resources and easy accessibility. The library not only contains the highest authorities on military history and science but has one of the finest collections of Congressional documents in existence.

The Chief Signal Officer notes with pleasure the gratifying results of better classification and more effective service, due to the intelligent methods of Librarian James W. Cheney and his staff.

DISTRIBUTION OF WAR DEPARTMENT DOCUMENTS.

Nearly all the publications issued by the War Department are received, temporarily stored, and carefully distributed by this division. About 65,000 documents have been disposed of during the year. This work has been most efficiently performed, and the employees are entitled to credit for having accomplished such satisfactory results under very unfavorable working conditions.

A. W. GREELY,
Chief Signal Officer.



Williams Welch - Feb. 1907

REPORT OF THE CHIEF OF ARTILLERY.

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REPORT OF THE CHIEF OF ARTILLERY.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ARTILLERY,
Washington, November 12, 1903.

SIR: In compliance with the requirements of paragraph 366, Army Regulations, I have the honor to submit the following report:

SHORTAGE OF AVAILABLE EXPERIENCED OFFICERS.

Under the act of Congress approved February 2, 1901, the Artillery Corps to-day consists of 1 chief of artillery, 13 colonels, 13 lieutenant-colonels (plus 2 detailed in staff), 39 majors (plus 5 detailed in staff), 195 captains (plus 7 detailed in staff), 195 first lieutenants (plus 2 detailed in staff), 176 second lieutenants (plus 2 detailed in staff), or a total commissioned strength of 632. Of this number 365, or 57.7 per cent, have had less than five years experience as commissioned officers. Of the 267 artillery officers of more than five years experience, the following are on detached service:

Lieutenant-colonel, acting inspector-general.....	1
Majors, in General Staff	2
Major, military attaché.....	1
Major, on college duty.....	1
Major, member of the Ordnance Board	1
Total field officers absent	6
Captains, United States Military Academy.....	13
Captain at Saumur, France	1
Captains, instructors, School of Submarine Defense.....	3
Captains, instructors, Artillery School	6
Captain, military attaché	1
Captains, on General Staff	3
Captains, on recruiting service	3
Captains, students, School of Submarine Defense	10
Captains, on college duty	3
Captain, judge-advocate of a department.....	1
Captain, on duty with Cuban artillery	1
Total captains absent	45
Lieutenants, students at Artillery School.....	2
Total number of officers of over five years experience absent	53

From the above it will appear that only about 34 per cent of the total number of artillery officers present for duty have had over five years experience in the artillery. The gravity of this situation will be readily appreciated when it is recalled that at the present time the duties and responsibilities of an artillery officer are greater than ever before. It is neither good administration nor fair to the officer concerned to put an inexperienced one in a position of command, where ignorance may result in the loss of human life, or in the destruction of thousands of dollars of Government property.

The duties of an artillery district commander are of an exacting nature. He is responsible for the fighting efficiency of his district, which calls for frequent technical inspections. The organization of the corps provides for 39 extra captains and 45 lieutenants (6 first lieutenants and 39 second lieutenants), evidently with the idea that each colonel of artillery, as in infantry and cavalry, be allowed 2 staff captains. Owing to the great number of captains on detached service it has been necessary to largely reduce the number and rank of the district commander's staff, and in some cases colonels have been obliged to select lieutenants of very short service for this most important work. The district staff have to fill the positions of district adjutant, district ordnance, district signal, district engineer officer, and officer in charge of submarine defense, and with the important duties and technical qualifications required it can readily be seen how necessary it is for the district commander to have experienced captains for these positions.

GENERAL SHORTAGE OF OFFICERS.

Aside from the absence of experienced officers, much embarrassment has been caused by the shortage of officers of all grades.

The following table shows the number absent from their commands:

Lieutenant-colonels	1
Majors	5
Captains	45
First lieutenants	22
Second lieutenants	43
Vacancies	19
Total	135

The Secretary of War has relieved this situation as it existed a year ago and before, by directing that officers from the line of the Army detailed for duty at the Military Academy, on recruiting service, and college duty, be furnished from the three arms proportionately to the number of officers in each arm. This has resulted in a considerable reduction of artillery officers so detailed.

REMEDIAL MEASURES TAKEN.

- (a) The Secretary's order fixing proportion.
- (b) Effort to concentrate technical artillery staff duties at artillery district headquarters, thus relieving the post staff of much of this duty and giving more officers available for duty with companies. (G. O., 51, A. G. O., 1902; G. O., 39 and G. O., 40, A. G. O., 1903, and G. O., 36, W. D., 1903.)
- (c) Requiring instruction and practice to include for each organization only one battery of heavy guns and one of rapid-fire guns annually,

leaving the balance of the armament to be cared for merely, and used as little as possible consistent with efficient care. (G. O., 100, A. G. O., 1903.)

(*d*) Authorizing and requiring the detail of competent noncommissioned officers on special duty as gun commanders, observers, etc., thus diminishing the amount of instruction required. (G. O., 100, A. G. O., 1903.)

MEASURES TAKEN TO INCREASE NUMBER OF EXPERIENCED OFFICERS.

(*a*) Increase of class at Artillery School from 30 to 50 members.

(*b*) Establishment of post school for officers, General Orders, No. 102, Adjutant-General's Office, 1903, and its special application to artillery officers, in General Orders No. 21, Adjutant-General's Office, 1903.

OTHER MEASURES WHICH MAY BE TAKEN BY EXECUTIVE ACTION.

(*a*) Withdrawal of Coast Artillery troops from the foreign possessions of the United States.

(*b*) Extension of (*b*) and (*d*) above as rapidly as conditions permit.

A FURTHER REMEDY FOR SHORTAGE OF OFFICERS.

The position of instructor at the United States Military Academy and at the service schools will always require the detachment of a fixed number. It is therefore recommended that Congress be asked to provide for an academic staff, to include all officers of the line detailed on duty as instructors at the United States Military Academy or at the service schools. A detail in the academic staff should be for four years, and the place of an officer so detailed should be filled in a manner similar to the method which now obtains in the Staff Corps, as provided in the act of February 2, 1901. By this means the line of the Army would not be compelled to bear the burden of the details at the Military Academy and the service schools. Such a measure, if passed, would increase the Army by about 125 officers of all grades, and its salutary effect would be immediately felt.

DETAIL OF OFFICERS.

General Orders, No. 6, Adjutant-General's Office, 1903, directed that officers who desire details in the several staff departments or corps under the provisions of the army reorganization act, approved February 2, 1901, and those who desire service in the field artillery, as well as captains who desire to take the course of instruction at the school of submarine defense, will submit applications therefor through military channels. Recommendations for these details have, as far as practicable, been made from those who have applied under this order.

TRANSFER OF OFFICERS.

A station card for each officer of the Artillery Corps has been prepared, and in making transfers every effort has been made to equalize service at desirable and undesirable posts.

MOBILIZATION FOR COAST DEFENSE.

The regular establishment, Coast Artillery, authorized by the act of February 2, 1901, is 126 companies, of an aggregate maximum strength of 525 officers and 13,734 enlisted men. It may be said that this could be counted on to effectively man the 12-inch guns and mortars, provide for the submarine defense, and operate accessories appertaining thereto. It is believed to be essential to efficiency in war that the regular *Coast Artillery* establishment be ultimately increased to 751 officers and about 22,000 enlisted men for existing armament. An immediate increase is neither contemplated nor recommended, as efficiency coupled with due economy demands, first, the thorough assimilation of officers appointed since the Spanish war, who are commanding or liable to command organizations. This assimilation is progressing as rapidly as facilities permit. The class of student officers at the Artillery School has been increased from 27 in 1902 to 50 for the present year; all that can possibly be accommodated at Fort Monroe.

The companies of Coast Artillery now stationed in Hawaii and the Philippines should be returned to the United States before any increase of the Coast Artillery is asked for, as they are not now performing artillery duties proper, and there are no fortifications in those places.

THE MILITIA'S PART IN THE MOBILIZATION.

To secure efficient support by the militia in the mobilization of the coast defenses is a problem, the solution of which was outlined in the Annual Report of the Secretary of War of last year in the portion devoted to the advocacy of a new militia law. The act of January 21, 1903, to promote the efficiency of the militia, and for other purposes, provides (section 3), as a necessary preliminary to enable State troops to constitute a portion of the organized militia, that "the organization * * * of the organized militia in the several States, etc., shall be the same as that which is now or may hereafter be prescribed for the Regular and Volunteer Armies of the United States within five years from the date of the approval of this act." So far, no State troops are organized similarly to the Coast Artillery of the Regular Army, and after January 20, 1908, unless the regular organization is adopted, could not be constituted as organized coast artillery militia, and resort to volunteers would be necessary. Before suggesting that an invitation be extended to the seacoast States to adopt the regular organization of the Coast Artillery for their present national guard regiments and battalions which are being instructed in coast artillery duties, a study has been undertaken in this office to determine the assignment to forts and batteries best suited to develop the maximum efficiency of the coast artillery militia, having in view the kind and amount of instruction which can be imparted to them. This preliminary is deemed desirable in order that an invitation may be extended to each State affected to organize a fixed number of officers and men as coast artillery with a view to their assignment for instruction and practice in peace and service in war to forts and batteries which can be designated at the same time. This will be made the subject of a special report in the near future. It is now estimated that the total number of militia coast artillery needed to complement the regular Coast Artillery for the defenses as they now exist is 500 commissioned officers and 14,000 enlisted men.

MILITIA FOR LAND DEFENSE OF SEACOAST FORTIFICATIONS.

This is a subject not so pressing, but still of great importance, particularly as all estimates of the requisite number of coast artillerymen, both regular and militia, have been made on the assumption that sufficient infantry would be available for the land defense.

The recent maneuvers in the artillery district of Portland, Me., afforded means for a practical determination of the employment which may effectively be made of the organized militia, both as an artillery reserve and as infantry for land defense—the First Massachusetts Heavy Artillery and a brigade of Maine infantry having cooperated with the regular troops in the defense. Excellent and enthusiastic work was done by all.

Other opportunities to observe the practical work done by militia coast artillery have been afforded by the encampment of the Thirteenth Regiment, Heavy Artillery, National Guard, State of New York, two companies of the Connecticut Coast Artillery at Fort Terry, N. Y., and by the encampment of a battalion of California Coast Artillery at the Presidio of San Francisco. In each case considerable practical instruction was given and target practice undertaken with good results.

The Chief of Artillery is fully alive to the necessity and desirability of fixing the relations of the organized militia to the Coast Artillery for the manning of the coast defenses, and anticipates the development of marked efficiency in the militia and a corresponding sense of satisfaction and security in the Artillery Corps as soon as these relations are established. It is believed that the militia can find its greatest usefulness in undertaking to furnish the manning body for the lighter armament, particularly the rapid-fire guns. The efficient handling of a battery of 8, 10, or 12 inch rifles, and particularly of mortars, can only be secured by their constant use and study by a trained personnel. These weapons are designed for long-range fire. Under favorable conditions the limit of effective fire of a 12-inch gun or mortar is about 7 miles. The number and location of these batteries has been determined upon the assumption that they can be effectively used at long ranges—5,000 to 12,000 yards. This can not be done without an intimate acquaintance with ballistic theory and its incessant application in practice, which can only be attained by those who devote themselves exclusively to its study. An action between forts and ships will be as short as the ships can make it. The volume of fire from a single battle ship equals that of the average fort. Every shot from the fort must count, and successive shots must be delivered with great rapidity and accuracy. It is believed that an adequate artillery defense of the coast harbors demands a complement of coast artillerymen sufficient for the heavy armament installed, which it appears is about three-fourths completed as projected.

PROGRESS OF THE COAST ARTILLERY.

DISTRICT ORGANIZATION.

The longer the division of the artillery into districts has been tried the more satisfactory it has proved. By General Orders, No. 27, Adjutant-General's Office, March 11, 1903, after a thorough trial, the duties and power of the district commander have been succinctly defined with

resultant efficiency. By this order all of the defenses of a given locality are placed under the command of the senior artillery officer, who is responsible to his military superiors for the fighting efficiency of his command.

MANEUVERS.

During the latter part of August combined maneuvers were held in the artillery district of Portland, which embraces Forts Preble, Williams, Levett, and McKinley. The modern artillery installation necessary for fire control and direction is the result of evolution, and the annual maneuvers have been of great service in deciding upon the proper equipment. As a school of instruction for field and company officers they have been of incalculable benefit. The thanks of the artillery are due to the Navy for the energetic and willing manner in which their portion of the maneuvers has been conducted and for their unflagging zeal and enterprise.

It is recommended that steps be immediately taken to select the district for the ensuing year, in order that ample time may be given to the various supply departments to provide the necessary equipment.

The part played by the organized militia in these maneuvers has been already referred to.

Operations not classed as maneuvers, but of similar benefit and with practically no additional expense, were undertaken in the Department of the Columbia by the department commander. These consisted in the regular garrisons stationed in the artillery district of the Columbia (Forts Stevens, Columbia, and Canby), and in the artillery district of Puget Sound (Forts Flagler, Worden, and Casey) watching for the approach of divisions of the United States naval forces on the Pacific station (news of which had been received, but the exact time of which within two or three days was unknown), and the simulation of an artillery defense. Exercises of a similar nature can be undertaken with great benefit in other departments.

INSTRUCTION.

The expenditure of the appropriations of last year for equipment and ammunition for target practice has greatly increased the facilities for instruction of the troops, which has been more practical than has heretofore been possible. The organization of artillery districts, with regular and frequent inspections, has resulted in uniformity of method and increased efficiency.

The instruction of officers under the provisions of General Orders, No. 102, Adjutant-General's Office, 1902, and General Orders, No. 21, Adjutant-General's Office, 1903, in accordance with the recommendation of the War College Board, assures to the newly appointed officer systematic guidance of the more experienced in the indication of the knowledge required and the direction in which his efforts should be exerted to master his profession. After completing the prescribed courses, an officer, with proper application, should have little difficulty in preparing for his examination for promotion. An effort is being

EXAMINATION FOR PROMOTION OF OFFICERS.

After carefully considering the question in all its phases the artillery board, Fort Monroe, Va., upon recommendation of this office, has revised the examination of officers for promotion so as to bring within its scope all of the essentials of an artillery officer's qualifications. The requirements of this examination, while thorough, are not beyond the capabilities of those who have a fair education, coupled with a sense of their obligations to the Government. It is with pride that the Chief of Artillery invites attention to several lieutenants recently appointed who have successfully prepared themselves for promotion without the assistance of the course at the Artillery School. To maintain the Corps of Artillery at the requisite standard of efficiency it is essential that the requirements of this examination be rigidly adhered to, and officers who fail to meet them should be eliminated from the service.

ARTILLERY PRACTICE.

With the allowance of ammunition provided for by the appropriation of \$350,000 (fortification act approved February 27, 1903) greatly increased efficiency is already apparent. This appropriation can not be too liberal. It is the least of the fixed charges for maintaining artillery troops in an efficient state of preparedness, and it is earnestly recommended that Congress be requested to further enlarge it.

Upon the recommendation of the board appointed by the Secretary of War in compliance with the fortification act of June 6, 1902, to test disappearing gun carriages, the allowance for each coast artillery company has been fixed at 15 rounds for target practice with full service charges.

In General Orders, No. 100, Adjutant-General's Office, 1903, the method of conducting artillery practice was modified and a technical report from each company required to be submitted to the chief of artillery, from which it will be possible to institute a comparison of the practice by different companies and different districts. This will, it is hoped, when published to the troops, increase the rivalry and efficiency of the different organizations.

Experimental firing with subcaliber ammunition, with a view to adopting a uniform method of conducting this practice, and its utilization principally for instruction of individual gunners and in fire control, has recently been completed. The experiments indicate that the allowance of subcaliber ammunition can be advantageously increased as indicated above.

It is gratifying to state that the reports of practice with mortars indicate a marked improvement in accuracy, but the allowance of ammunition is insufficient to effectively develop the use of this important element of coast defense.

ARTILLERY SCHOOL.

The artillery school at Fort Monroe, Va., has been reorganized, and the plan of reconstruction adopted is commensurate with its dignity and the aims undertaken. Within a short time the post will be thoroughly equipped with an efficient system of fire control where student officers will be given every facility to become familiar with this most important work.

SCHOOL OF SUBMARINE DEFENSE.

The class which graduated at the school of submarine defense on October 7, 1903, was composed of ten captains of several years service, who now become available for service on the staffs of the district commanders. The work done by the student officers and the torpedo company at Portland during the maneuvers is a gratifying evidence of the thoroughness of the course at that place.

SUBMARINE DEFENSE.

The depot of supplies of material for submarine defense is located at Fort Totten, N. Y. All submarine property has been by General Orders, No. 133, Adjutant-General's Office, 1902, taken up on ordnance return. Requisitions are consolidated by the commandant, school of submarine defense, and forwarded to the Chief of Ordnance through the Chief of Artillery.

Four boats for planting submarine mines, especially designed by the Quartermaster's Department, are now nearing completion, three to be stationed on the Atlantic coast and one on the Pacific coast. Under the command of officers, they are to go from district to district, giving instruction in the planting and maintenance of mines.

TORPEDO COMPANY.

By General Orders, No. 9, Adjutant-General's Office, 1903, the Fifty-fourth Company, Coast Artillery, was organized as a "torpedo company," with station at Fort Totten, N. Y., the seat of the school of submarine defense. This company was increased to 140 men, who are constantly under instruction as submarine miners, the purpose being to periodically distribute trained men from this company to form a nucleus in each district for detachments of submarine miners, the men so distributed being replaced by others from the districts receiving them. This company took part in the combined maneuvers at Portland, where it performed excellent service, characterized by the great rapidity and accuracy with which the mines were planted.

MASTER ELECTRICIANS.

By the army appropriation act for the fiscal year ending June 30, 1904, 25 master electricians were added to the Artillery Corps. They receive \$75 per month and the allowances of an ordnance sergeant. The rules for appointment of master electricians were announced in General Orders, No. 63, Adjutant-General's Office, April 28, 1903, and at this date 6 have been appointed, 4 from former electrician sergeants and 2 from civil life.

ELECTRICIAN SERGEANTS.

The electrician sergeants' division of the School of Submarine Defense has undertaken the instruction of 25 candidates for that position this year. The facilities are insufficient for the best work possible, and estimates for the extension of the plant have been submitted. Twenty-seven candidates qualified and were appointed electrician sergeants during the past year.

INCREASED PAY FOR ELECTRICIAN SERGEANTS.

Attention is invited to the recommendation in former reports for a material increase in the pay of electrician sergeants, in order that young men from civil life may be induced to take these positions. The pay of a first-class sergeant of the Signal Corps, whose duties are certainly not more important than those of electrician sergeants, is \$45 per month, while that of the latter is but \$34. It is also urged that capable young men in civil life are reluctant to bind themselves for three years, and additional advantages are necessary to encourage them to enter the service, as well as to retain those who are already in it.

INCREASED NUMBER OF ELECTRICIAN SERGEANTS.

The recommendation of last year that Congress be requested to provide for 125 electrician sergeants is renewed. The authorized number was increased to 100 by the army appropriation act for the fiscal year ending June 30, 1904.

GUNNERY SPECIALISTS.

The school of gunnery specialists (master gunners) at Fort Monroe, Va., has been successfully inaugurated and 9 of the 21 candidates qualified. Attention is particularly invited to the report of the work done by six of these in the artillery district of Portland during the combined maneuvers, which was not only satisfactory, but far exceeded the most sanguine expectations. The commandant of the Artillery School, in his annual report to the Adjutant-General, recommends that Congress be asked to enact a law given in the following bill:

AN ACT to increase the efficiency of the Coast Artillery, United States Army.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the approval of this act any enlisted man of whatever grade of the Coast Artillery, United States Army, who holds a certificate of proficiency in the course of instruction for qualification as a master gunner, prescribed, or to be prescribed, by the Secretary of War, shall receive fifteen dollars per month in addition to the pay of his grade and length of service: *Provided,* That no company of Coast Artillery shall have more than three master gunners: *Provided,* That the benefit of the certificate of master gunner shall be forfeited if the holder thereof be out of the coast-artillery service for more than three months: *Provided further,* That any enlisted man of the Coast Artillery holding such certificate at the date of his retirement shall be retired with the pay and allowance of his grade, inclusive of his additional pay as master gunner.

This recommendation is earnestly commended for favorable consideration. Increased pay is necessary not only to retain these men in service, but to secure a reasonable competition for the position. It is proposed that they be especially charged with the duty of operating the instruments used in position finding and of assisting in the preparation of the charts and scales used. This requires a high degree of skill.

PROGRESS OF EQUIPMENT FOR FIRE CONTROL AND DIRECTION.

This includes range and position finder stations for the batteries and fire commands, the installation of electrical communications, search-lights, etc. It has proceeded as rapidly as the limited appropriation admitted, and was confined on account of limited funds very largely

to the artillery district of Portland, in anticipation of the maneuvers, and to the forts at Pensacola, Fla., for the experiments conducted there in April last, under the direction of the Board of Ordnance and Fortification, to determine a type of installation suited to the latest developments.

THE PENSACOLA TEST.

This crystallized the ideas of the leading students and experts in the matters involved, and has proved of the greatest benefit to the service by permitting the determination of a definite type, enabling the supply departments to submit comprehensive estimates for the completion of all the fortifications in this respect. The test of the system was thoroughly carried out by the officers and men charged with it, and the scheme, with some few modifications with the idea of increasing elasticity in its use, was adopted by the board and approved by the Secretary of War.

TEMPORARY INSTALLATIONS.

Under the provisions of General Orders, No. 59, Adjutant-General's Office, 1903, great progress has been made in providing a temporary method for fire direction and control, which, as funds permit, can be readily and economically adapted to the one decided upon as a result of the Pensacola test.

The cooperation of the Chiefs of Engineers and Ordnance and the Chief Signal Officer and the officers of their departments in all this work deserves hearty acknowledgment from the Artillery Corps.

REVISION OF THE DRILL REGULATIONS, COAST ARTILLERY.

The great progress since 1898, when the present drill regulations were adopted, in the knowledge of the needs of coast defense and the practical fulfillment of these needs to a great extent, has rendered the present drill regulations largely obsolete, and a revision by a board of artillery officers is now in progress, which it is anticipated will be ready for issue in a few months.

THE FIELD ARTILLERY.

THE NEW GUN.

With the adoption of a rapid-fire field gun, the Field Artillery is about to be placed on a footing of equality with that of other armies. The change will be revolutionary, and its quick and effective accomplishment will call for close study on the part of officers of the Field Artillery.

ORGANIZATION.

The batteries of Field Artillery are now (with a few exceptions, mostly temporary) organized into battalions, under the command of field officers. This system has the merit of coordinating the instruction of all battalions and keeping them prepared for immediate service under the direction of the field officers who would command them in war.

The general shortage of officers has fallen heavily on the Field Artillery, although a constant endeavor is made to have this arm bear only its share. There are two battalions for which no field officer is now available.

SERGEANTS-MAJOR.

In the reorganization of the artillery provision was made for only 48 sergeants-major, and with two exceptions it has been found necessary to assign them all to the Coast Artillery, where their services are more urgently needed. It is recommended that Congress be asked to increase by 12 the number of sergeants-major, junior grade, with a view to their assignment to the field-artillery battalions. At present battalion commanders are forced to call upon one of their batteries for the detail of a noncommissioned officer for this duty.

INSTRUCTION.

This has made satisfactory progress during the year, and has been further systematized by the issuance of General Orders, 126, Adjutant-General's Office, 1902, prescribing a new system of examination for gunners of Field Artillery, and particularly by the issuance of General Orders, 71, Adjutant-General's Office, 1903, prescribing a programme of instruction for batteries of Field Artillery, amplifying instructions in the drill regulations.

DUTIES OF THE COMMANDER OF A BATTALION OF FIELD ARTILLERY.

These are succinctly defined in General Order 71, Adjutant-General's Office, 1903, with the result, it is believed, of removing all causes of misunderstanding, which have in some instances existed, of the relations of the Field Artillery to the other arms with which they may be stationed.

MANEUVERS.

Nearly all of the batteries in the United States have participated this year in the field maneuvers undertaken at West Point, Ky., and at Fort Riley, Kans., or have attended the camps of instructions of the organized militia. Every effort should be made to concentrate as many of these batteries as possible on each of these occasions in the future, not only for their own benefit, but to accustom the other arms to their presence and to that reliance on their cooperation which can only come from such association.

Very respectfully,

WALLACE F. RANDOLPH,
Brigadier-General, Chief of Artillery.

The CHIEF OF STAFF, UNITED STATES ARMY,
Washington, D. C.

**REPORT OF THE BOARD OF ORDNANCE AND
FORTIFICATION.**

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REPORT OF THE BOARD OF ORDNANCE AND FORTIFICATION.

WAR DEPARTMENT,
Washington, D. C., October 1, 1903.

THE SECRETARY OF WAR.

SIR: Under the provisions of the act approved February 24, 1891, the Board of Ordnance and Fortification has the honor to submit, for transmission to Congress, its thirteenth annual report, covering the fiscal year from July 1, 1902, to June 30, 1903.

CHANGES IN PERSONNEL.

There have been but two changes in the personnel of the Board since the last report. Lieut. Gen. Nelson A. Miles, president of the Board since 1895, was retired from active service by operation of law on August 8, 1903, and by Special Orders, No. 185, War Department, A. G. O., Brig. Gen. G. L. Gillespie, Chief of Engineers, was designated as president of the Board. Brig. Gen. John I. Rodgers was retired from active service on October 15, 1902, and Maj. M. M. Macomb, Artillery Corps, was detailed to fill the vacancy by Special Orders, No. 245, Headquarters of the Army, A. G. O., October 18, 1902.

By Special Orders, No. 20, Headquarters of the Army, A. G. O., January 24, 1903, Capt. Harry Taylor, Corps of Engineers, was relieved, and Capt. W. W. Gibson, Ordnance Department, detailed as recorder of the Board. Captain Gibson was relieved and Capt. T. C. Dickson, Ordnance Department, detailed as recorder by Special Orders, No. 157, Headquarters of the Army, A. G. O., July 7, 1903.

The Board now consists of the following members: Brig. Gen. G. L. Gillespie, Chief of Engineers, president; Brig. Gen. Wallace F. Randolph, Chief of Artillery; Lieut. Col. Charles Shaler, Ordnance Department; Lieut. Col. Sedgwick Pratt, Artillery Corps; Maj. M. M. Macomb, Artillery Corps, and Hon. Thomas J. Henderson, civilian member.

LEGISLATION.

The only special legislation affecting the Board is contained in the fortifications appropriation act approved March 3, 1903, making appropriation for continuing the work of the Board, as follows:

To enable the Board to make all needful and proper purchases, experiments, and tests to ascertain, with a view to their utilization by the Government, the most effective guns, small arms, cartridges, projectiles, fuses, explosives, torpedoes, armor plates, and other implements and engines of war, and to purchase or cause to be

manufactured, under authority of the Secretary of War, such guns, carriages, armor plates, and other war material as may, in the judgment of the Board, be necessary in the proper discharge of the duty devolved upon it by the act approved September twenty-second, eighteen hundred and eighty-eight; to pay the salary of the civilian member of the Board of Ordnance and Fortification provided by the act of February twenty-fourth, eighteen hundred and ninety-one, and for the necessary traveling expenses of said member when traveling on duty as contemplated in said act; for the payment of the necessary expenses of the Board, including a per diem allowance to each officer detailed to serve thereon when employed on duty away from his permanent station of two dollars and fifty cents a day; and for the test of experimental guns, carriages, and other devices procured in accordance with the recommendation of the Board of Ordnance and Fortification, one hundred thousand dollars, the expenditure of which shall be made by the several bureaus of the War Department heretofore having jurisdiction of the same or by the Board itself, as the Secretary of War may direct: *Provided*, That before any money shall be expended in the construction or test of any gun, gun carriage, ammunition, or implements under the supervision of the said Board, the Board shall be satisfied, after due inquiry, that the Government of the United States has a lawful right to use the inventions involved in the construction of such gun, gun carriage, ammunition, or implements, or that the construction or test is made at the request of a person either having such lawful right or authorized to convey the same to the Government.

That all material purchased under the foregoing provisions of this act shall be of American manufacture, except in cases when, in the judgment of the Secretary of War, it is to the manifest interest of the United States to make purchases in limited quantities abroad, which material shall be admitted free of duty.

SUBJECTS CONSIDERED.

The subjects presented to the Board for consideration vary widely in character. Many of the devices presented are found to be without novelty, while others are more remarkable for their novelty than utility. Each, however, has been given the same careful consideration, and it is believed that every device promising military usefulness has received favorable action.

GENERAL OPERATIONS.

As a result of the exhaustive tests of field artillery conducted in the fall of 1901 and spring of last year, the Board recommended for adoption for the Army a 3-inch rapid-fire gun mounted on a long recoil carriage, designed and submitted by the Ordnance Department. The results of the tests made show that when equipped with these guns and carriages the field artillery of our Army will have a weapon equal, if not superior, to that of any nation.

Another subject of importance to which the Board has given attention is the development of a system of fire control and direction for coast artillery. The tests conducted in Pensacola Harbor were exhaustive, and have resulted in the adoption of a system which, when installed, with such modifications as experience may suggest, as a part of the coast defense, will render it more than ever effective.

Several large allotments have been made aside from that for test of the fire-control system. One of these was to determine the penetrating and "biting" angles of capped projectiles when fired against deck armor. Another was for the development of a portable searchlight plant. Work under these allotments is in progress.

THE HUNDRED-GUN CONTRACT.

By the terms of the contract entered into November 7, 1891, between the Bethlehem Iron Company, now the Bethlehem Steel Company, and the Chief of Ordnance, the company agreed to deliver twenty-five

8-inch, fifty 10-inch, and twenty-five 12-inch guns for coast defense. The present condition of the work is as follows:

Eight-inch guns, all delivered.

Ten-inch guns, all delivered except one, which is assembled with the exception of the A and B hoops, both of which are finish-bored ready for assembling.

Twelve-inch guns, 15 completed and delivered. Of the remaining 10 guns, the breech mechanisms of all are completed, the forgings all made, and some assembled. The work on remainder is well under way, and it is expected that the contract will be completed this year.

FIRE CONTROL FOR COAST DEFENSES.

In September, 1900, Col. J. P. Story, Artillery Corps, inspector of artillery, Department of the East, proposed the establishment of a horizontal base system of fire control, utilizing depression range finders as base-end instruments, and suggested Fort Wadsworth as a suitable point at which to conduct the necessary tests. The Board approved of the plans presented and designated Fort Wadsworth as the place of test. In March, 1901, Maj. Sedgwick Pratt, Artillery Corps, was, on the recommendation of the Board, detailed at Fort Wadsworth to superintend the installation of the system. A board of officers, with Colonel Tiernon, Artillery Corps, as president, was also convened to prepare a program of tests.

As the program developed, the impracticability of satisfactorily conducting extensive tests in New York Harbor became apparent, and finally Maj. G. N. Whistler, Artillery Corps, was directed to visit Pensacola Harbor, Florida, and make an estimate of the cost of conducting the tests at that point.

Estimates were prepared, and on January 6, 1902, an allotment of \$15,000 was made for the purpose of conducting tests of a system of fire control and direction at that place. This allotment was increased \$5,000 on April 5, 1902, and subsequently by \$4,000 in several small allotments as the work of installation progressed. August 26, 1902, an allotment of \$15,000 was made for purchase of the necessary ammunition.

The system proposed by the Wadsworth board was installed, under direction of the artillery district commander, by Maj. G. N. Whistler, Artillery Corps. The establishment of so extensive a system, with the erection of the observing stations, the laying of cables, and installation of instruments, necessarily consumed much time. Preliminary drills were had early in the present year, and on April 20 the test was commenced in the presence of the Board.

On May 28, 1903, the Board considered the detailed report of the artillery district commander on the results of the test, which was then referred to the Chief of Artillery for examination and report.

The report of the Chief of Artillery, based upon the tests in Pensacola Harbor, recommended a complete system of fire control and direction for coast artillery, with the necessary instruments, etc., required therefor. The Board recommended the adoption of the system and material proposed by the Chief of Artillery, and on August 8, 1903, this recommendation was approved by the Secretary of War.

These tests are among the most important work conducted by the Board in the last few years, and the installation of the proposed system, following adequate appropriations therefor by Congress, will do much to increase the efficiency of our coast defenses.

THE LANGLEY AERODROME.

Early in the year 1898 a board composed of officers of the Army and Navy was appointed to examine the models and principles of the aerodrome devised by Dr. S. P. Langley, Secretary of the Smithsonian Institution, and to report whether or not, in its opinion, a large machine of this design could be built; and if so, whether it would be of practical value.

The report of this board was referred to the Board of Ordnance and Fortification for action, and Doctor Langley was invited to appear before the Board and further explain the proposed construction.

In view of the great utility of such a device, if a practical success, the Board on November 9, 1898, made an allotment of \$25,000 for the construction, development, and test of an aerodrome to be made under the direction of Doctor Langley, with the understanding that an additional allotment of the same amount would be made later. On December 18, 1899, the additional allotment of \$25,000 was made.

The construction of the machine was delayed by Doctor Langley's inability to procure a suitable motor, which he was finally obliged to design. The aerodrome was completed about July 15, 1903, and its test is in progress.

EXPERIMENTAL GUNS AND CARRIAGES.

The Emery 12-inch elevating carriage.—The construction of this carriage was authorized by a special act of Congress appropriating \$130,000 for the purpose in February, 1893, and a contract was entered into in March of that year with Mr. A. H. Emery, though the actual work of construction was not commenced until 1896, when, by act of June 6, an additional appropriation of \$10,000 was made for a loading apparatus for the carriage, and the inventor was relieved of the obligation of giving bond for the return of any money paid him should the carriage not prove to be successful. By act of May 25, 1900, the sum of \$40,000 was added to the contract price of the carriage, and by act of March 3, 1903, the further sum of \$40,000 was appropriated to enable Mr. Emery "to complete and erect the 12-inch carriage."

The total amount appropriated for this carriage and appurtenances is therefore \$220,000, of which \$135,656.98 has been paid. According to Mr. Emery's several reports there have been completed 10,971 parts of the carriage of an aggregate weight of 419,457 pounds. Mr. Emery reports under date of July 23, 1903, that "this completes the loading apparatus and most of the carriage except the springs."

The Brown 10-inch segmental-tube wire-wound gun.—This gun was built under an allotment of \$33,000 made by the Board September 15, 1896, and was completed in December, 1899, but owing to delays on the part of the trustees of the Brown patents in designating a suitable powder, the preliminary firing tests of the gun were not begun until February, 1901. The first proof round with a pressure of 10,000 pounds developed a crack extending through the third chase hoop. As this hoop is a thin covering used to protect the wire from mechanical injury, it was not believed the defect had in any way weakened the gun, and on March 6, in the presence of the Board, three additional rounds were fired, with pressures ranging from 15,700 to 26,900 pounds.

It being evident from these and subsequent rounds that with the special kind of powder determined upon the required velocities could not be obtained, the Board on April 6, 1901, granted the request of the trustees to increase the chamber capacity of the gun. This alteration necessitated sending the gun to the shops of the manufacturers. When returned it was again mounted, and firing tests renewed on October 28, 1901.

On the second round, with a charge of 175 pounds Du Pont smokeless powder for 12-inch rifle and a recorded pressure of 51,550 pounds per square inch, the breech bushing, which was of cast steel and carried the breechblock and mechanism, was torn from the gun and blown backward several hundred feet. October 31, 1901, the Board inspected the gun and found that, except as above indicated, it was uninjured. Permission was granted to remove the gun for repairs, with the understanding that the Government was to be put to no expense therefor.

August 12, 1902, the trustees again requested permission to further enlarge the chamber of the gun, and August 26 the Board granted this permission. In July, 1903, the gun was returned to the proving ground and mounted for continuation of test under a program of 100 rounds approved by the Board.

July 30, 1903, one shot was fired in the presence of the Board, with a charge of 100 pounds of smokeless powder. The breechblock was jammed by this shot and required considerable force to open it. The test is being continued.

The Brown 6-inch segmental-tube wire-wound gun.—The act of Congress approved June 6, 1902, providing for fortifications and other works of defense, including the armament thereof, contained a provision that, in the discretion of the Secretary of War, a portion of the money appropriated could be used for the purchase of material for a limited number of steel-wire seacoast guns. The trustees of the Brown wire gun patents made application to the Secretary of War to be permitted to furnish guns of their design under this clause.

The Secretary of War on July 21, 1902, referred to the Board for consideration and recommendation the question of whether or not it was advisable to adopt as a type the Brown segmental-tube wire-wound gun and to purchase or construct guns of that description for the service of the United States.

On August 7, 1902, the Board replied that "it is not at present prepared to recommend the Brown segmental-tube wire-wound gun as a type for the service." The Board did, however, recommend, and the Secretary of War approved, an allotment of \$25,000 to procure one Brown 6-inch wire-wound rapid-fire gun with suitable mount, implements, and accessories and 500 rounds of ammunition. This allotment was, on December 4, 1902, increased \$16,000 upon the representations of the trustees as to the cost of manufacture, and the amount of ammunition to be furnished was reduced to 250 pounds. The aggregate amount allotted is therefore \$41,000.

The object of this purchase is to obtain a wire-wound gun of the latest design proposed by the Brown Wire Gun Company with a view to its test and to determine the question whether or not other guns of the same design shall be procured as a part of the coast defense system.

The company reported under date of June 23, 1903, that the work of constructing the gun is being expedited as rapidly as it can be done consistent with good workmanship.

The Crozier 6-inch wire-wound gun.—In connection with the allotment for the purchase of the Brown 6-inch wire-wound gun it should be mentioned that the Board at its meeting on September 10, 1903, made an allotment of \$11,000 for the construction of a gun on the design of Gen. William Crozier, Chief of Ordnance. This gun differs in many respects from the Brown gun, the most noticeable difference being the absence of the segmental tube which is one of the features of the Brown system, and the Board expects to test it in comparison with the gun of the same caliber built on the plans of the Brown Company.

RAPID-FIRE GUNS AND MOUNTS.

The Vickers-Maxim 6-inch gun and mount.—On the recommendation of the Chief of Ordnance, the Board on January 26, 1900, made an allotment of \$18,500 for the purchase of a type 6-inch rapid-fire gun with pedestal mount from Messrs. Vickers, Sons & Maxim. On October 4, 1900, an allotment of \$2,000 was made for procuring smokeless powder charges for use during tests of the gun, and on April 5, 1902, a further allotment of \$4,794 was made to provide the additional ammunition necessary for test of the gun under the program approved by the Board. The test of the gun was commenced in February, 1902, and a total of 159 rounds have been fired. No particular feature of the equipment has commended itself to the Board for adoption, though the test was generally satisfactory.

The Bethlehem 6-inch rapid-fire gun and mount.—On January 3, 1901, the Board made an allotment of \$17,900 for the construction of a type 6-inch rapid-fire gun with pedestal mount, the design of the Bethlehem Steel Company. The gun is to be capable of being fired at least 8 rounds in one minute with 2,500 foot-second velocity, and to give a muzzle velocity of 3,000 foot-seconds with a projectile weighing 100 pounds without excessive pressures.

The ammunition for the proof firing test will be furnished by the company without expense to the Government and the equipment is not to be paid for unless it fulfills the specified requirements.

On August 12, 1903, the company reported the gun assembled, finish turned, and rifled, and the breech mechanism about 85 per cent completed. The mount is completed with the exception of the sleeve for carrying the V-shaped shield. The shield is also completed.

Bethlehem 5-inch gun on combination carriage.—On May 4, 1900, the Board made an allotment of \$14,000 for the construction of a 5-inch gun and carriage proposed by the Bethlehem Steel Company. The carriage is of a special type, intended to combine the characteristic features of both the disappearing and the rapid-fire mounts. It is stipulated in the contract that before payment is made for the material it must pass such firing tests as may be prescribed by this Board. The contract was dated July 2, 1900, and the gun and carriage were to have been delivered ready for test not later than July 2, 1901. Owing to the experimental nature of the carriage, however, the work has been somewhat delayed. It was found necessary to replace the breechblock of the gun with one of a new design, and as the finished gun is required for balancing certain parts of the carriage, the completion of the carriage was thereby further delayed. The material will probably be delivered for test within the next six months.

Bofors cast-steel 15-centimeter gun and mount.—On January 10, 1898, the Board made an allotment of \$13,000 to procure from the Aktiebolaget Bofors-Gullspang, of Sweden, one 15-centimeter rapid-fire cast-steel gun with pedestal mount and 100 rounds of ammunition. An additional allotment of \$2,417 for the same purpose was made April 12, 1898. Although it was the understanding at the time of making the allotments that the material would be delivered ready for test within twelve months, the gun and projectiles were not received at the proving ground until July of 1901, and owing to lack of space was not mounted until March, 1902, when preliminary firing was commenced to determine the proper charge of powder to be employed, the company not being able to ship the necessary powder, for which an allowance in contract price was made. On April 5, 1902, an allotment of \$1,673 was made for ammunition for test of this gun.

After firing 150 rounds of the program the Ordnance Board submitted a preliminary report giving the results obtained and recommending certain minor changes in the mechanism to permit the use of combination electric and percussion primers. These changes were approved by the Board on February 5, 1903. The gun has since been fired 145 times, making a total of 295 rounds, and has withstood the severe tests to which it has been subjected in a very satisfactory manner.

AUTOMATIC GUNS AND MOUNTS.

McClellan 1-pounder automatic gun.—In April and June, 1899, the Board made allotments aggregating \$884.28 to reimburse the Navy Department for a 1-pounder rifle barrel and 500 rounds of ammunition furnished S. N. McClellan, who had submitted to the Board a 1-pounder automatic gun and mount. On January 26, 1900, the Board witnessed a preliminary firing test of the gun and on May 4, 1900, made an allotment of \$3,000 for the purchase of 1,000 rounds of ammunition and to cover other incidental expenses of a thorough firing test of the equipment as soon as completed. In August, 1900, 500 rounds of ammunition was furnished Mr. McClellan for use in the experimental development of his gun and the cost charged to the allotment of \$3,000.

May 28, 1903, the Board witnessed an exhibition test of this gun at the Sandy Hook proving ground, at which time the Vickers-Maxim and Hotchkiss guns were also fired. The Ordnance Board was requested to continue test of the guns under a program adopted for the purpose.

Hotchkiss 1-pounder automatic gun.—On June 8, 1900, the Board made an allotment of \$4,052.50 to purchase from the American Ordnance Company a Hotchkiss 1-pounder automatic gun and carriage, and on October 4, 1900, an additional allotment of \$1,300 to procure the ammunition necessary for a test of the gun.

The gun was delivered at the proving ground in November, 1900, and on March 6, 1901, was fired in the presence of the Board. Test of the material was about to begin when an offer was received from the representatives of the Hotchkiss Company to exchange it for a gun and mount of the latest design without expense to the Government. This offer has been accepted and delivery of the new material is shortly expected, when the tests will be commenced.

Vickers-Maxim 1-pounder automatic gun.—April 4, 1900, the Board made an allotment of \$8,300 for the purchase of a Vickers-Maxim

1-pounder automatic gun and carriage and 2,000 rounds of ammunition. Test of the material was commenced July 22, 1902, 966 rounds being fired under the program adopted. No action has been taken on this material, as it is being held to await completion of trials of the McClean and Hotchkiss guns.

TESTS OF ARMOR PLATE AND SHIELDS.

March 6, 1903, an allotment of \$20,000 was made for procuring armor plate and to cover the cost of tests to determine at what angles of incidence projectiles of large caliber will "bite" and perforate the best quality of deck armor now being made. These experiments were proposed by Col. J. P. Story, Artillery Corps, for the information of a board of officers which is engaged in revising the coast artillery drill regulations. The program adopted provides for firing at 4½-inch nickel steel plates with 8, 10, and 12 inch capped A. P. projectiles at varying angles of impact and ending by firing a 12-inch capped A. P. shell charged with high explosive at an angle less than the biting angle to determine the effect of the explosive on the penetration. The program also provides, under certain conditions, for continuing the experiments with 3-inch plates. The tests are under way, and the program has been partially completed.

TEST OF STEEL PLATES.

June 25, 1902, an allotment of \$3,000 was made for the purchase and test of two steel plates 4½ inches thick, one cemented and the other noncemented. The object of the test was to obtain data for use in designing shields of this thickness. The tests clearly demonstrated the marked superiority of the cemented plate, and on March 6, 1903, a further allotment of \$1,700 was made to procure a similar plate of nickel steel for continuing the experiments. Five shots were fired at this nickel steel plate in comparison with the cemented plate and at the end thereof the plate was in better condition than the Krupp face-hardened plate.

SHIELDS FOR COAST DEFENSE GUNS.

On March 5, 1902, the Board made an allotment of \$7,600 for the construction of a 4½-inch face-hardened steel shield of design proposed by the Bethlehem Steel Company. The shield, when completed, is to be mounted on the 6-inch experimental gun and carriage now under construction by that company, and delivered at the proving ground of the Bethlehem Steel Company ready for test, it being the understanding that the Board will make an allotment to cover the cost of the test. Under date of August 12, 1903, the company reported that the shield is completed and that the sleeve to which it is to be attached is now being made.

June 25, 1902, the Board made an allotment of \$10,640 for the manufacture of an experimental shield of the design of the Ordnance Department. This shield is to be fitted for test to the 6-inch gun above mentioned. The company reports that the shield has been forged, treated, bent, machined, and is ready to have sight and portholes cut, after which it will be fitted to the mount.

MISCELLANEOUS.

The Isham Shell.—February 17, 1899, the Board made an allotment of \$15,000 to cover the cost of conducting experiments in throwing high explosives from powder guns by means of the Isham shell. This shell contained a number of transverse walls or diaphragms supported by a central column, all cast in one piece. It was loaded through orifices in the sidewalls.

On July 11, 1899, the Board witnessed the firing of an Isham shell charged with 113 pounds of explosive gelatin. The powder pressure in the gun was 32,100 pounds per square inch. The shell was unfused, as it was desired to test its ability to resist the shock of discharge and also that of impact. It was successfully discharged, struck the water, ricocheted several times, and finally disappeared without exploding. Further tests were continued during the summer and fall of 1899.

Mr. Isham then appealed to Congress for an appropriation for the purchase of the right to use his shell. The fortifications appropriations act of March 1, 1901, made an appropriation—

To enable the Secretary of War, in his discretion, and if in his judgment it will be for the best interests of the Government, to purchase * * * the Isham high explosive shell.

On June 17, 1901, the Secretary of War referred to the Board for consideration and remark the question of the proposed purchase of the Isham shell.

The Board on July 10, 1901, recommended that the "Isham shell be not purchased at this time."

Mr. Isham constantly urged the Board, if not satisfied with the results of tests already made, to make other and more complete tests, and finally on April 5, 1902, a program was adopted for firing three shells, as follows:

One of the shells to be first weighted with sand, but without explosive charge, and fired into a sand butt with a pressure of not less than 50,000 pounds to the square inch, to test its structural strength; the other two shells to be charged with explosive gelatine and fired, one with a pressure as near as may be to 38,000 pounds to the square inch and the other with a pressure as near as may be to 45,000 pounds to the square inch.

The object of this test was to "determine whether or not the Board should make an allotment to procure armor plate as a target to test the service efficiency of the Isham torpedo shell."

The tests made were not entirely satisfactory and the Board recommended the further trial of a sand-weighted shell, but on December 29, 1902, the Secretary of War directed that the Isham shell charged with a high explosive be fired "with as high a pressure as the previous experiments show to be a justifiable risk." Under these instructions, on January 22, 1903, two shots were fired, one with a pressure of about 42,000 pounds, which was successful, and the other with a calculated pressure of 50,000 pounds to the square inch. The latter shot resulted in the complete destruction of a 12-inch breech-loading rifle used for the experiments, and on February 5, 1903, the Board recommended that no further experiments be made with the Isham shell.

On May 9, and again on June 29, 1903, Mr. Isham requested that further tests be made of his shells, and in both instances the Board declined to recommend further tests.

Isham recoil spade.—October 16, 1902, the Board made an allotment of \$250 for construction of a recoil device for field guns, the design of Mr. W. S. Isham. The device was tested in June of the present year, and as a result the Board made a further allotment of \$50 to procure a somewhat wider and heavier spade to be attached to the same device. This is now being manufactured.

Modified Lewis position finder.—May 1, 1902, the Board made an allotment for the construction of a modified type of the Lewis range and position finder, certain mechanical defects having arisen in the continued use of the instrument in service. The United States Rapid-Fire Gun and Power Company, the manufacturers of the instrument, have completed the drawings of the modified design.

Davis horizontal base range finder.—On July 6, 1900, the Board made an allotment of \$200 to cover the cost of test of the principles involved in the design of a range finder proposed by Capt. H. C. Davis, Artillery Corps. Captain Davis reports, under date of July 23, 1903, that his other duties have been so pressing that he has had no time to give to the development of this device.

Phillips replotter boards.—April 18, 1901, the Board made an allotment of \$5,000 for the purchase of fifty replotter boards of the design of Capt. C. L. Phillips, Artillery Corps, which were issued to coast artillery forts for test and report. Very few reports have so far been received.

Manning ammunition cart.—January 3, 1901, the Board made an allotment of \$1,500 for the construction of an ammunition cart, the design of Maj. W. C. Manning, U. S. Army. The cart was completed and exhibited to the Board and has recently been sent to Fort Leavenworth for comparative test with the Allen ammunition cart and the ammunition feature of the Parker combination machine gun carriage and ammunition cart.

Allen ammunition cart and water carrier.—An allotment of \$700 was made by the Board November 9, 1901, for the construction by Mr. H. F. L. Allen of two ammunition carts and water carriers, the device being designed to work singly or in pairs. The cart was recently inspected by the Board and sent to Fort Leavenworth for comparative test with the Manning and Parker devices.

Parker combination carriage for machine guns and ammunition cart.—February 8, 1902, the Board made an allotment of \$1,000 for the construction of a sample carriage for machine guns, the design of Capt. John H. Parker, Twenty-eighth Infantry. This allotment was subsequently increased by two others of \$50 and \$100, respectively, for the purpose of providing a pack saddle. The ammunition carrying feature of the cart has also been developed to such an extent that the device has recently been sent to Fort Leavenworth for comparative test with the Manning and Allen carts.

Platform for test of gun carriages.—October 1, 1901, the Board made an allotment of \$6,000 for the construction of a platform at the Sandy Hook proving ground suitable for mounting for test all types of nondisappearing carriages. The platform has been completed and is being used at the proving ground.

Portable searchlight plant.—March 6, 1903, on the recommendation of the Chief of Engineers, the Board made an allotment of \$20,000 for the experimental development of an automobile gasoline or petroleum plant for operating searchlights. On July 31, 1903, the Chief of

Engineers reported that no work of construction has yet been undertaken or definitely decided upon, though careful investigation of the subject has been inaugurated, as it was decided not to waste funds in unsatisfactory experimentation.

Bore sight, Ordnance design.—The Board has made several allotments, aggregating \$500, for the construction of a telescopic bore sight for use in orienting guns. This sight has been completed and is undergoing test at the Sandy Hook proving ground.

Pierce photographic plane table.—April 23, 1898, the Board made an allotment of \$500 for the construction of a photographic plane table of the design of Mr. Josiah Pierce. Mr. Pierce died July 30, 1902, without having completed the instrument, and as it was found impracticable to proceed with the construction, work thereon was abandoned in May, 1903.

Orndorff woven gun slings.—May 8, 1901, the Board made an allotment of \$12,000 for the purchase of a number of Orndorff's woven gun slings, canteen and haversack straps. These were issued to a regiment of infantry stationed in the Philippines, and as a result of the test the Board, on June 20, 1903, recommended that they be not adopted.

Hoff's pouch for first-aid packet.—Col. J. Van R. Hoff, Medical Department, U. S. Army, proposed a form of pouch designed to be attached to the cartridge belt for carrying the first-aid packet. On July 12, 1901, an allotment of \$500 was made for the purchase of a number of these pouches, which were issued to troops in the Philippines for test. All the reports received were distinctly favorable to the device, and accordingly on April 3, 1903, the Board recommended its adoption as a part of the equipment of every soldier in the field.

Gibson bandolier.—In December, 1901, Dr. E. T. Gibson, contract surgeon, U. S. Army, was informed that if he would furnish 25 of the bandoliers for cartridges, devised by him, they would be tested. The bandoliers were furnished and sent to the Philippines for test. As the result of the test the Board on April 3, 1903, recommended that the bandolier be not adopted for service.

Batson-Sawtelle road level.—November 17, 1896, the Board made an allotment of \$200 for the purchase of a road level, the design of Captains Batson and Sawtelle of the Army. Captain Sawtelle reported under date of August 25, 1902, that because of litigation relative to the patent the device was not further developed than when first proposed, and the outbreak of the Spanish war prevented completion of the instrument, though the patent has since been secured. July 20, 1903, a letter was addressed to Captain Sawtelle, asking what progress had been made during the past year on his road level, but no reply has been received.

Safety shields for target ranges.—August 7, 1902, the Board made an allotment of \$3,500 for the construction and test at the Presidio of San Francisco of a device proposed by Maj. Gen. R. P. Hughes, U. S. Army. This device consists of a series of steel shields with openings therein, placed at intervals along the target range, and is designed to prevent stray bullets going wide of the target. It has been erected, tested, and the report received. The device accomplishes its purpose in an effective manner.

De Thierry flexible saddletrees.—November 9, 1901, the Board made provision for procuring from Mr. F. de Thierry, the inventor, twelve saddles with flexible trees, which were finished at Rock Island Arsenal and submitted to test by cavalry troops. The reports received showed that these saddles were inferior to the McClellan tree, and on April 3, 1903, the Board recommended that they be not adopted.

Merriam pack.—April 5, 1900, Gen. H. C. Merriam, U. S. Army, appeared before the Board and invited attention to the service value of the Merriam pack for carrying extra clothing, blankets, rations, etc. The Board recommended the purchase of 1,000 of these packs and their distribution to at least ten different infantry regiments for trial and report. The reports were received and filed for future reference.

Lanz canteen.—August 30, 1901, the Board accepted the offer of the Lanz Manufacturing Company to furnish 100 of the Lanz canteens without expense to the United States for test. The canteens were distributed to troops in the Philippines for trial, and but few reports have been received.

AUTOMATIC PISTOLS.

Luger automatic pistol.—At its meeting April 6, 1901, the Board made an allotment of \$15,000 for the purchase from the Deutsche Waffen- und Munitions-Fabriken of Berlin of 1,000 Luger automatic pistols of 7.65-millimeter caliber, for practical service test in the field.

The preliminary tests at Springfield Armory gave most satisfactory results and when received the pistols were distributed to the cavalry and light artillery. Commanding officers of organizations were instructed to make a report on the arm. The reports received varied so widely in the expression of opinion as to the merits of the arm that the Board, on April 3, 1903, made provision for exchanging fifty of the 7.65-millimeter pistols for fifty of 9 millimeters with 3½-inch length of barrel, and when received they will be submitted to a final test by the cavalry and light artillery boards at Fort Riley to determine their suitability for adoption in the military service. On April 18, 1903, an allotment of \$3,500 was made to procure ammunition for these tests, which it is expected will take place this fall.

Colt's automatic pistol.—A new model of this arm having successfully passed the test at Springfield Armory, the Board at its meeting January 11, 1902, made an allotment of \$4,000 for the purchase of 200 of the latest model. These arms were distributed for practical test and report. Very few reports have, however, so far been received.

INTRENCHING TOOLS.

For several years the Board has had under consideration the subject of intrenching tools and in this time has tested exhaustively a number of designs and patterns. The results of these tests confirmed the Board in the opinion expressed at its meeting of December 19, 1899, viz:

It is of the first importance to place in the hands of the troops, not only the most destructive weapon, but one that gives the greatest rapidity of fire. This requires a liberal supply of ammunition to be carried on the person of the soldier and emphasizes the necessity of reducing the weight of his equipment to a minimum. The Board does not therefore feel justified in adding to the burden necessarily borne by the soldier when rapidity of movement is of vital importance.

With present methods and means of transportation, supplies and extra equipments may readily be furnished troops operating in the field, thus making available such implements as axes, picks, spades, and shovels for the heavier work of intrenching, bridge building, etc.

In the fall of 1902 tests were conducted at the Engineer School of Application, and as a result the Board recommended the following equipment of intrenching tools for a company of infantry, the equipment varying slightly for cavalry and artillery, though substantially the same:

Intrenching equipment for company of infantry.

List of articles.	War strength, 150.			Peace strength, 65.		
	Quantities.	Total weight.	Total cost.	Quantities.	Total weight.	Total cost.
		<i>Pounds.</i>			<i>Pounds.</i>	
Augers, 1-inch	1	2	\$0.85	1	2	\$0.85
Axes	6	36	4.50	4	24	3.00
Bars, crow	1	10	.60	1	10	.60
Hatchets	6	12	2.40	4	8	1.60
Machetes, with sheaths	20	40	40.00	10	20	20.00
Nails, assorted, pounds	10	10	.50	5	5	.25
Pick mattocks, with carriers	30	144	67.50	15	72	33.75
Pliers, wire cutting	10	10	7.00	10	10	7.00
Rules, 2-foot	2	4	.50	2	4	.50
Saws, hand, crosscut, with sheaths	1	8	2.00	1	8	2.00
Shovels, light, with carriers	40	134	52.00	20	67	26.00
Rope, 24-inch, feet	250	60	7.80	250	60	7.80
Odometers	2	6	18.00	2	6	18.00
Reconnaissance outfit, individual	2	10	59.00	1	5	29.50
Total		462½	262.65		297½	150.85

It is proposed that all of the above equipment shall be carried habitually in the company pack or wagon transportation. When necessary, however, either from the nature of the terrain or for tactical reasons, shovels and pick mattocks can be carried on the person of the foot soldier or the horse of a mounted man.

It should be remarked that the equipment above described was adopted prior to completion of the new United States magazine rifle, which has a ramrod bayonet instead of knife bayonet, and this change will necessitate the adoption of a light, individual intrenching tool. Experiments are in progress to determine what form this shall take.

ESTIMATES FOR THE COMING YEAR.

In order to carry on the work of the Board for the fiscal year ending June 30, 1905, an estimate of \$100,000 has been submitted to the Secretary of War for transmission to Congress, and it is recommended that the appropriation be made in a single amount, as heretofore.

RECOMMENDATIONS.

The Board renews its former recommendations that appropriations by Congress should be sufficient in amount to provide a reserve supply of ammunition of at least 100 rounds for each large caliber gun and mortar, and at least 250 rounds for each rapid-fire gun as soon as mounted, as without an adequate supply of ammunition it is needless to say that the armament of the coast defenses is useless.

In addition to the above-enumerated supply of reserve ammunition, there should be provided an ample allowance of ammunition for the annual target practice. This allowance for each company of coast artillery should be not less than 18 rounds per year for practice with the 8-inch, 10-inch, or 12-inch rifles, or 30 rounds for 12-inch mortars, and not less than 24 rounds per company for the 4-inch, 4.7-inch, 5-inch, or 6-inch rapid-fire guns, and not less than 30 rounds for the 6-pounder or 15-pounder rapid-fire guns. The present allowance for subcaliber and machine-gun practice should be continued.

It is also recommended that all target practice, except subcaliber, should be with full service charges of smokeless powder, as in no other way can the guns be satisfactorily operated or the personnel adequately instructed in their manipulation. The present allowance of ammunition has not been sufficient to thoroughly test the guns after their installation.

The Board renews the recommendation contained in its last three annual reports that steps be taken at an early date to provide the coast artillery personnel with suitable ranges and other facilities for carrying out each year a system of practical drill and target practice with heavy guns under conditions approximating those of actual service.

As the primary object of the defenses is to protect the harbors and waterways along our coasts, the guns are, as a rule, so placed that target firing, with full service charges and at longer and more important ranges, can seldom take place without endangering the lives and damaging the property of private citizens. This is particularly true in the case of fortifications defending the larger harbors where there is shipping constantly within range and where private houses are in such close proximity to the guns as to be seriously affected by shock. At least three such ranges should be provided—one for the North Atlantic, one for the South Atlantic and Gulf, and one for the Pacific coast.

Another of the most important features of the coast defense has not been adequately provided for, and this is the installation of a proper fire-control system at each coast artillery fort. Ample provision should be made for the purchase of range finders and other instruments for fire control, the installation of additional searchlights, and the necessary cable for conducting the electric power to the various parts of the fortifications and furnishing the essential lines of communication. Not less than \$2,000,000 should annually be appropriated for these purposes for the next several years, and the Board is aware of no object for which such sum can more effectively be expended or from which greater benefit will be derived.

FINANCIAL STATEMENT.

In compliance with the act of February 24, 1891, which requires "a detailed statement of all contracts, allotments, and expenditures made by the Board," an exhibit, marked "Appendix A," accompanies this report giving a detailed statement of the allotments and expenditures from July 1, 1902, to June 30, 1903, the period covered by this report.

No contracts have been made by the Board during the fiscal year.

On July 1, 1902, the Board had on hand \$229,715.48, and by act of March 3, 1903, \$100,000 was appropriated; to this is added the sum of \$30,840 revoked from prior allotments, making the total available

\$360,555.48. In the year past the Board has made allotments aggregating \$157,280.94 and turned into the Treasury \$15,000, leaving a balance June 30, 1903, of \$188,274.54 for continuing the work of the Board, of which amount \$10,000 is available only for purchase and test of movable submarine torpedoes. In addition to the above there remains an unexpended balance of about \$27,000 from prior allotments which will be made available for continuing the experimental work of the Board.

G. L. GILLESPIE,

Brigadier-General, Chief of Engineers, President of the Board.

WALLACE F. RANDOLPH,

Brigadier-General, Chief of Artillery.

CHARLES SHALER,

Lieutenant-Colonel, Ordnance Department.

SEDGWICK PRATT,

Lieutenant-Colonel, Artillery Corps.

M. M. MACOMB,

Major, Artillery Corps.

THOS. J. HENDERSON,

Civilian Member of the Board.

T. C. DICKSON,

Captain, Ordnance Department, Recorder of the Board.

APPENDIX A.

TABLE SHOWING ALLOTMENTS AND EXPENDITURES MADE BY THE BOARD OF ORDNANCE
AND FORTIFICATION FROM JULY 1, 1902, TO JUNE 30, 1903, INCLUDING STATEMENT
OF UNEXPENDED BALANCES.

Act of March 2, 1889.

1902.			
July 1.	Balance on hand	\$15,000.00	
1903.			
Mar. 6.	Revocation of allotment of July 1, 1896, for construction of Halpine torpedo	10,000.00	\$25,000.00
June 20.	Turned into Treasury to credit of war surplus fund from appropriation for torpedo howitzers		15,000.00
	Balance on hand ^a		10,000.00

Acts of 1892 to 1903, inclusive.

Balance on hand July 1, 1902	\$214,715.48	
Act of March 3, 1903	100,000.00	\$314,715.48

Revocations of allotments under these acts:

1902.			
July 29.	To offset two overcharges on account of experiments with aerodrome, Auditor's settlement No. 17181 .....	.58	
Aug. 7.	From allotments of August 1, 1901, for construction of bore sight .....	.22	
	7. From allotments of March 16, 1898, for experiments in wireless telegraphy	604.20	
Oct. 1.	From allotment of February 8, 1902, for experiments with live targets	15.00	
1903.			
Mar. 6.	From allotment of January 8, 1903, for armor-plate target for test of Isham shell	20,000.00	
	6. From allotment of October 3, 1901, for purchase of experimental fuses from H. V. C. Keeson	120.00	
May 27.	From allotment of March 6, 1903, for purchase of one Grubb sight	100.00	
			20,840.00
			335,555.48

Allotments during the year:

1902.		
Aug. 7.	Improvement of bore sight designed by Ordnance Department	102.00
	7. Device for use on target ranges, proposed by Gen. R. P. Hughes, U. S. Army	3,500.00
	7. Rafferty range and position finders, one type A and two type B	2,500.00
	7. Modification of Pratt ballistic board	15.00
	7. Construction of semiautomatic sight, design of Capt. S. C. Vestal and E. W. Hubbard	150.00
	7. Six-inch Brown segmental tube wire-wound gun, with mount, accessories, and ammunition	25,000.00

^a Available only for movable submarine torpedoes.

Allotments during the year—Continued.

1902.		
Aug. 26.	Ammunition for test of fire-control system in Pensacola Harbor.....	\$15,000.00
	26. To reimburse Ordnance Department for cost of fitting De Thierry flexible saddle trees.....	309.00
Oct. 16.	Recoil spade for field-gun carriage, design of W. S. Isham	250.00
	16. Target for fire-control experiments in Pensacola Harbor	1,000.00
	22. Test of Isham shell, including firing, recovery, and repair of sand butt	1,632.78
	22. Expenses of shipment of Isham shell	25.00
Dec. 4.	Thirty-seven millimeter Vickers-Maxim automatic gun, with mountain equipment	4,311.39
	4. Six-inch Brown wire-wound gun, additional	16,000.00
	4. Alteration of bore sight to adapt it for use with 8, 10, or 12 inch guns, additional	183.60
	4. Modification of automatic pistol by G. H. Powell	100.00
	4. Expenses of inspection of new breechblock of Brown 10-inch wire gun	30.00
1903.		
Jan. 8.	Armor-plate target for test of Isham shell	20,000.00
	8. Sand butt for test of steel plates	1,200.00
	8. Cost of prior experiments with Isham shell, additional to allotment of October 22, 1902	89.08
Feb. 5.	Two pack saddles for ammunition for Vickers-Maxim 37-millimeter gun, with ammunition boxes and belts	350.00
	5. Experiments with automatic pistol by G. H. Powell, additional	25.00
Mar. 6.	Test of deck armor to determine perforating angles, etc	20,000.00
	6. Experimental development of an automobile gasoline or petroleum plant for operating searchlights.....	20,000.00
	6. Purchase on one Grubb sight.....	100.00
	6. Nickel-steel armor plate for additional comparative tests.....	1,700.00
	6. Cost of work by Ordnance Department in connection with installation of fire-control system in Pensacola Harbor	1,000.00
	6. Cost of inspecting 6-inch Brown wire-wound gun	1,500.00
Apr. 3.	To reimburse Ordnance Department for cost of material destroyed in test of Isham shell.....	626.90
	3. To reimburse Ordnance Department for ammunition expended in test of Hubbard semiautomatic sight.....	399.65
	3. To cover cost of two aparejos and their alteration to fit Parker cart for mule transport	50.00
	18. Four subtarget gun machines.....	1,000.00
	18. Four timing devices, design of G. H. Powell	800.00
	18. Ammunition for test of Luger automatic pistol, caliber .39	3,500.00
May 27.	To reimburse Major Whistler for expenditures for stenographic services	37.35
	28. Manufacture of newspade for Isham recoil device	50.00
June 20.	Galloping carriage for Vickers-Maxim 1-pounder automatic gun	1,400.00
	20. Mounting plates and repair of backing during test of steel plates.....	200.00
	20. Drift ruler for Fort Du Pont, Del	50.00
	30. Expenses of the Board for the year.....	13,094.19
		<hr/>
		\$157,280.94
		<hr/>
		178,274.54

390 REPORT OF BOARD OF ORDNANCE AND FORTIFICATION.

RECAPITULATION.

Balance on hand and appropriated during the year, general fund	\$314,715.48	
Balance on hand, act March 2, 1889	15,000.00	
		<u>\$329,715.48</u>
Allotments revoked, general fund	20,840.00	
Allotments revoked, act March 2, 1889	10,000.00	
		<u>30,840.00</u>
Total available		<u>360,555.48</u>
Allotments during the year	157,280.94	
Turned into Treasury	15,000.00	
		<u>172,280.94</u>
Available for allotment		<u>188,274.54</u>

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